FOOD MANUFACTURE

Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP 337 JULY 1, 1958

WITHAM RASPBERRY *flavour*

The delicate, elusive tang of the Raspberry is perhaps one of the most difficult of all flavours to capture and concentrate. WITHAM RASPBERRY Flavour, however, proves that it can be done, when attempted with the skill and experience which Bush bring to all their 'true-to-the-fruit' flavours.

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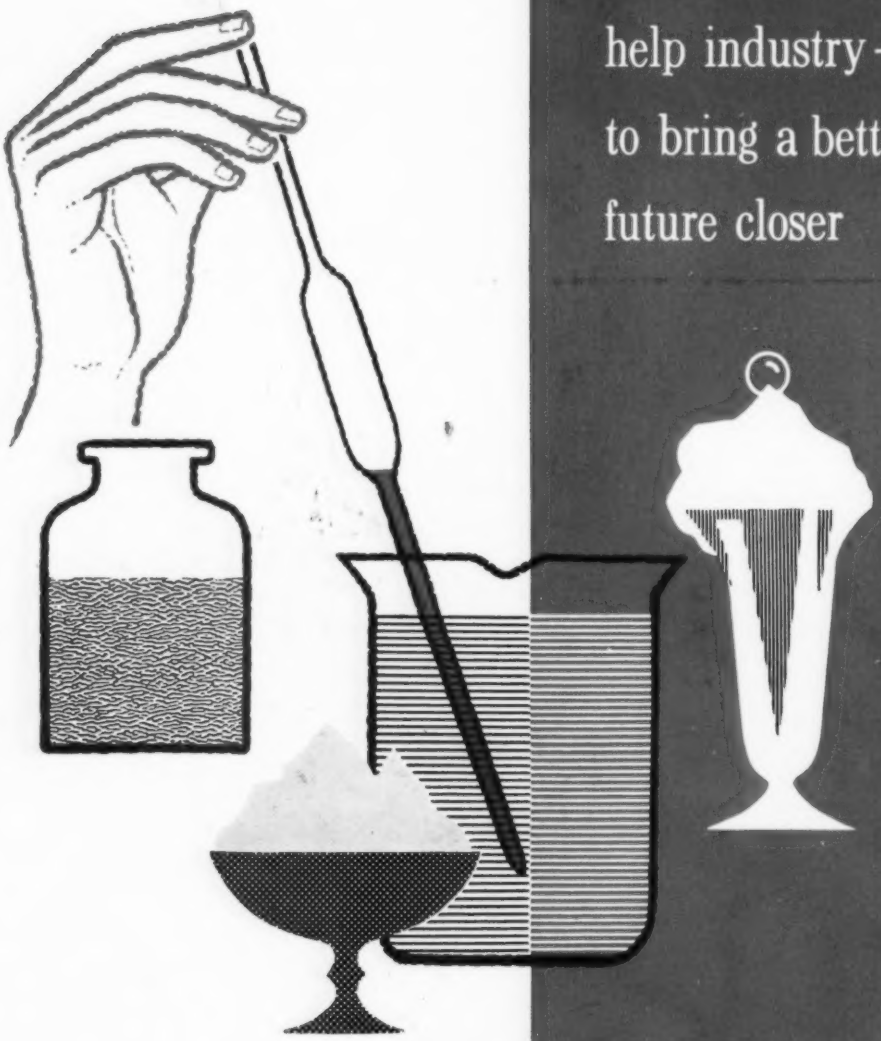

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Mincers have been eliminated. There is now no need to spend laborious hours de-rinding. The Super Flitzer is a most economical machine. And what a time-saver!

It is simplicity itself to operate, easy to clean and needs only the minimum of maintenance.

Please phone or write for demonstration.

Hilgeland Hints

* No. 1
PORK FAT EMULSION

No more de-rinding! Simply cut off the best fat and put the rest through this machine, with your other pork trimmings. A smooth fresh emulsion will result. Add 5 ozs. of MSB for every 100 lbs.

Up to 20% of this emulsion can replace the same quantity of meat in your normal mix for sausages with better colour and texture and longer keeping qualities.

* No. 2
BEEF FAT EMULSION

Put complete flanks of beef and any trimmings through this machine and for every 100 lbs. add 5 ozs. of MSB.

The homogenised emulsion obtained can be added to an equal quantity of meat and will give beef sausages bloom, binding power and flavour.

* No. 3
LUNCHEON, SAVELOY POLONY, ETC.

No more mincing! Simply put your usual meat and fat, including rinds, etc., through this machine. Add 30% water and 5 ozs. of MSB to every 100 lbs. Mix with normal ingredients.

This mixture will give the finished product binding power, more flavour and a natural meaty texture.

* No. 4
FRANKFURTERS AND MORTADELLA, ETC.

40 lbs. lean beef, pork or veal
30 lbs. pork fat emulsion (see No. 1)
24 lbs. water
6 lbs. Special Foodtech Primamix
5 ozs. MSB

Mix all ingredients and run twice through the machine. This homogenised mixture can then be filled in the normal manner and a top quality product is assured.

Also used for Chicken, Fish, Vegetables and Fruit

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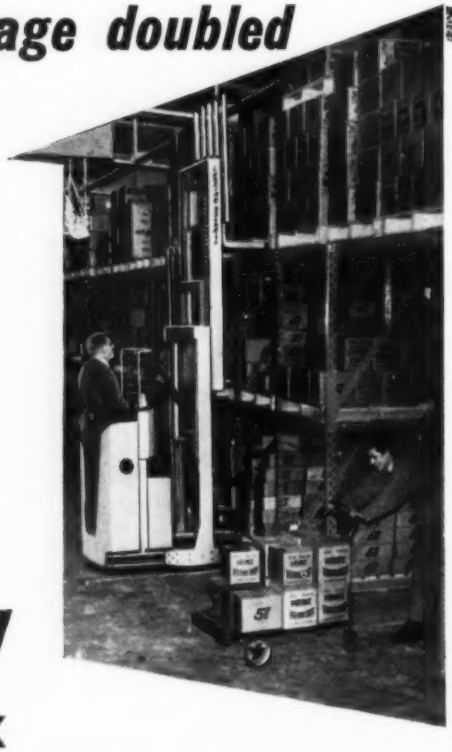

The Lansing Bagnall Reach Truck can handle one ton loads in gangways only half as wide as those for ordinary Fork Trucks. The Reach Truck enters the gangway with the load retracted within its wheelbase and then "reaches" it forward for stacking purposes.

Running cost is only 4d. a day, this being their cost of battery re-charging after a days' work. The truck incorporates a built-in charger, providing re-charging by simply plugging into the mains power supply.

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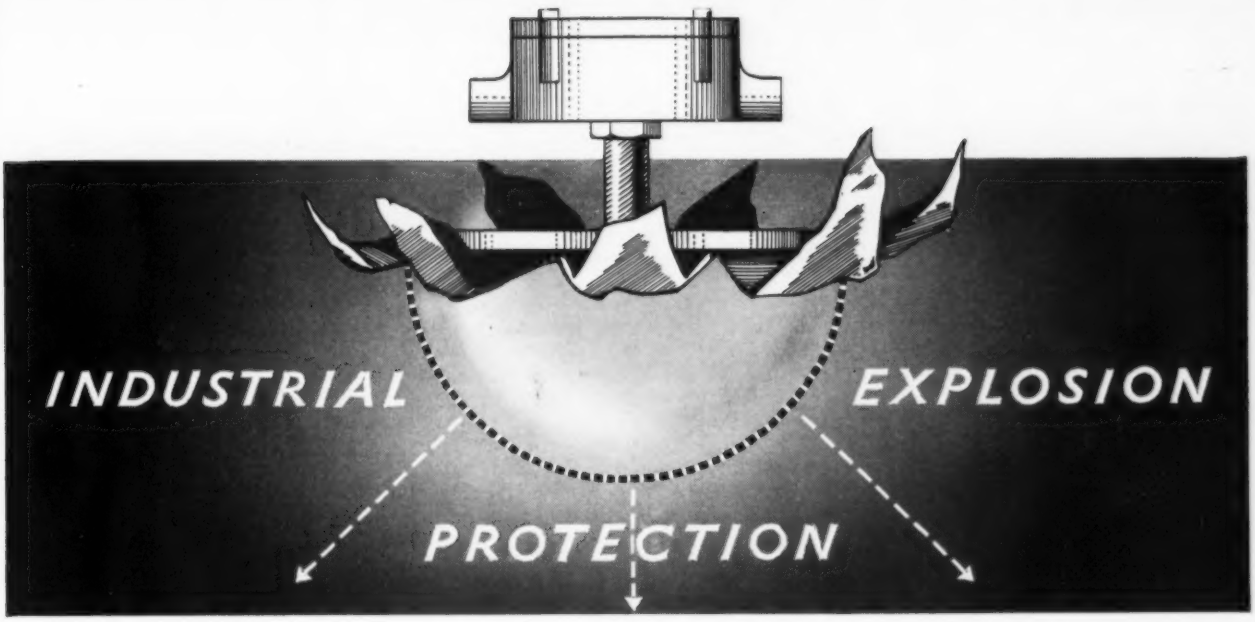
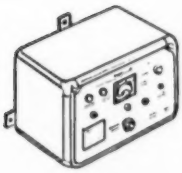


Any material that will burn in the bulk can explode as a dust/air mixture when sufficiently finely ground. Explosions are therefore liable to occur in any plant where such materials are processed or handled.

Illustrated below are just a few of our many types of equipment for combating explosions.

PNEUMATIC EXPLOSION DETECTOR for the detection of explosions very early in their pressure growth.

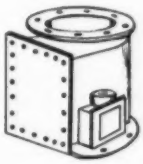


ELECTRICAL POWER UNIT provides the current for operating equipment when explosion detector contacts close.

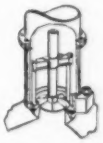
"ARMOURPLATE" GLASS BURSTING DISC for the relief of gaseous and dust/air mixture explosions.

HIGH RATE DISCHARGE BOTTLE used when hemispherical suppressors can not be accommodated internally.

HEMISPHERICAL SUPPRESSOR for the internal suppression of explosions.



HIGH SPEED ISOLATION VALVE for preventing flame in ducting. An eight inch valve fully closes in eighty milliseconds.



EXPLOSION RELIEF VALVE for the relief of gaseous and dust/air mixture explosions, where a pressure operated vent is permissible.

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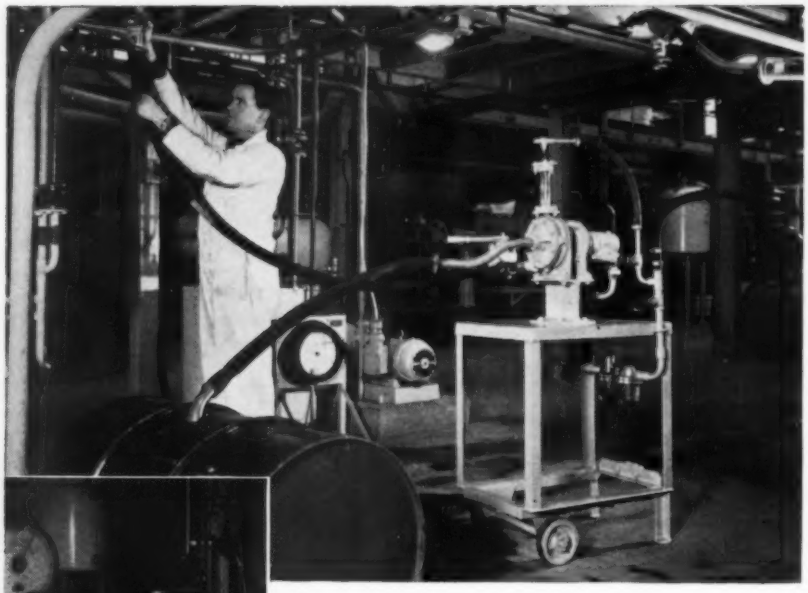
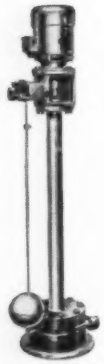


Photographs taken in their Beeston factory by courtesy of Boots Pure Drug Co. Ltd.

When the Pump must go to the Fluid

Boots Pure Drug Company Limited, in the manufacture of corticosteroids, find it more practical in some of their operations, to take their pumps—Safran compressed air driven units—to the fluid, coupling up their power with conveniently located air points. In the illustrations, two of these transportable units are shown pumping inflammable solvents in a flame-proof area. The pumps are ¾ in./1 in. (F.M.B.) Stainless Steel units fitted with 1 b.h.p. Holman Air Motors. Running speed is 2,700 r.p.m. to handle 600 gallons of fluid per minute at 48 ft. head.



Another SAFRAN transportable unit. Sump Drainer for a variety of dewatering purposes. Float control switchgear incorporated. Size 1 in.

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SAFRAN PUMP DIVISION
DRAYTON STREET WOLVERHAMPTON

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Throughput	100-400 gallons per hour
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Labour	only semi-skilled available
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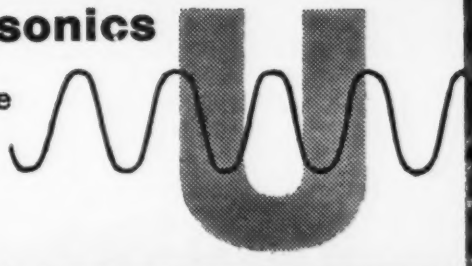
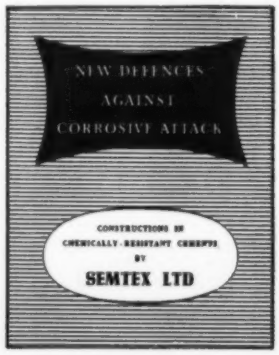


IS CORROSION COSTING YOU MONEY?

WHEREVER corrosion attacks plant or buildings it also attacks your pocket.

It can be the cause of constant repair, mounting costs, interruption of production while repairs are being effected. So wherever processing involves chemicals of a corrosive nature get SEMTEX, the anti-corrosion specialists, to proof factory floors, storage bays, machine beds and, where necessary, walls against corrosion. SEMTEX have specialised in this work for many years and can give the best possible advice on the subject before suggesting the type of anti-corrosion treatment your plant needs. Consult

This free book will give you full details of the SEMTEX Anti-corrosion Service —write for it today!



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AN EXCLUSIVE RECIPE FROM THE FREDK. BOEHM EXPERIMENTAL KITCHEN

Chicken stock	15 gallons.
Milk	11½ gallons.
Wheat Flour	16 lbs.
Butter	9 lbs.
Salt	2½ lbs.
New Protex No. 8	1 lb.
M.S.G.	10 ozs.
Onion Powder	10 ozs.
Sugar	6 ozs.
Saromex celery (on salt)	4 ozs.
Ground white pepper	1 oz.

Dressed chickens are processed until the flesh is tender, with sufficient water to cover, in a retort. The meat is stripped from the bones and then chopped into small pieces. The residue is added to the liquor and re-processed to provide the stock, which is sieved before use.

The wheat flour is whisked with the milk before addition to the rest of the ingredients which have been previously brought to the boil in a stainless steel steam-heated jacketed pan, equipped with a stirrer.

The soup is then homogenized at 1500 p.s.i. and then held at 200°F. prior to filling. ¾ oz. of chicken pieces is placed in each plain No. 1. Tall can and the soup then filled. After sealing the cans are processed for 1¼ hours at 240°F. then water cooled. Yield: approximately 30 gallons.

Remember that the Fredk. Boehm Experimental Kitchen exists to help you. Perhaps you have a recipe of your own which is proving to be a problem; or perhaps you want a recipe prepared for you by experts. That is where our unrivalled experience can help you. Write to us at the address below. The service, by the way, is FREE.

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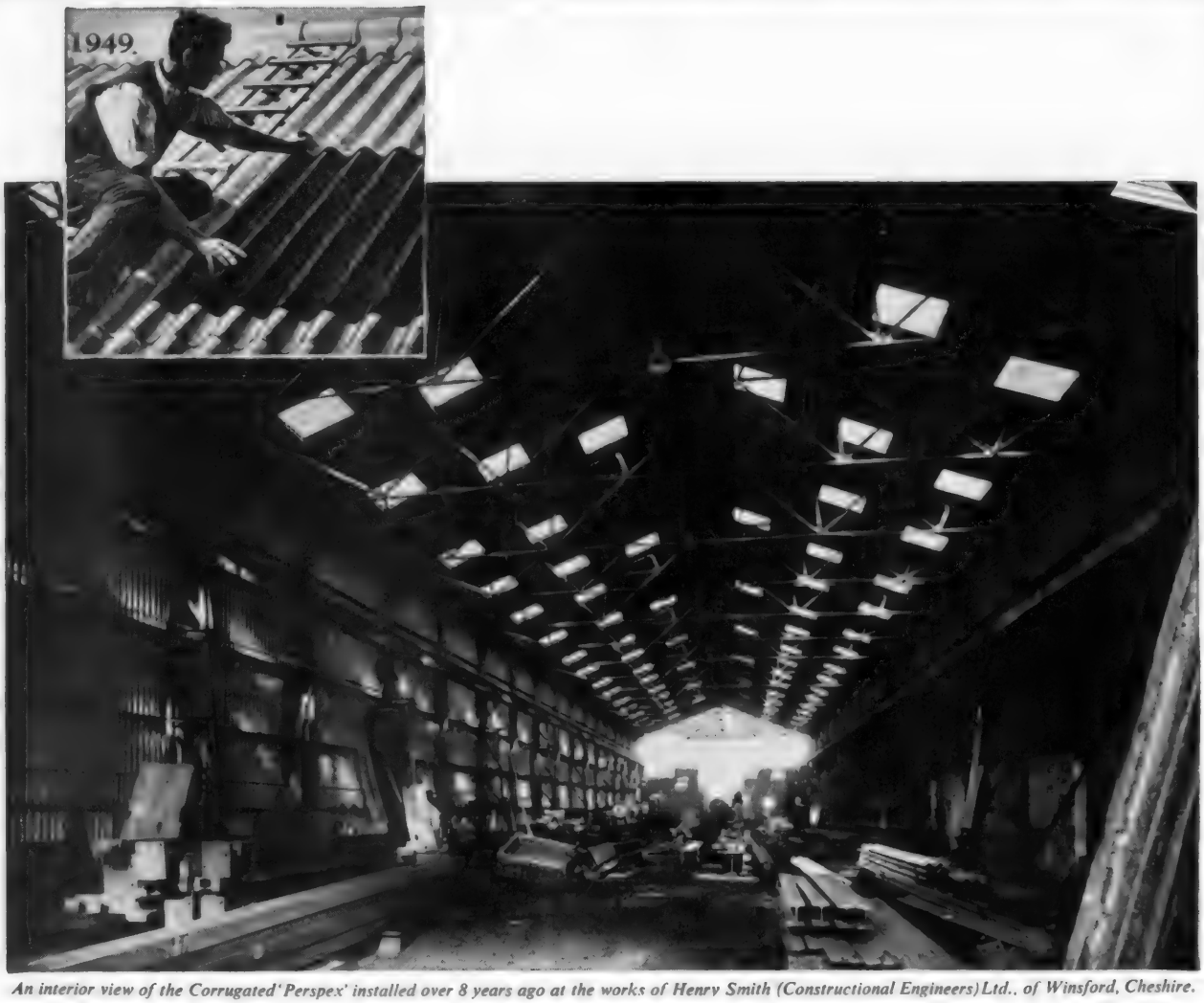

An interior view of the Corrugated 'Perspex' installed over 8 years ago at the works of Henry Smith (Constructional Engineers) Ltd., of Winsford, Cheshire.

Corrugated 'Perspex' as efficient as ever after 8 years continuous use in steelworks

OVER 8 YEARS ago Henry Smith (Constructional Engineers) Ltd. installed Corrugated 'Perspex' in their works at Winsford, Cheshire. To-day it is still giving as efficient service as when it was installed.

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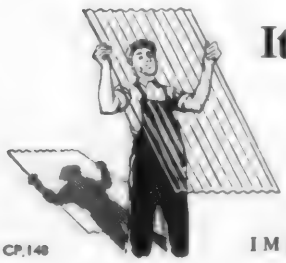

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'Perspex' is the registered trade mark for the acrylic sheet manufactured by I.C.I.

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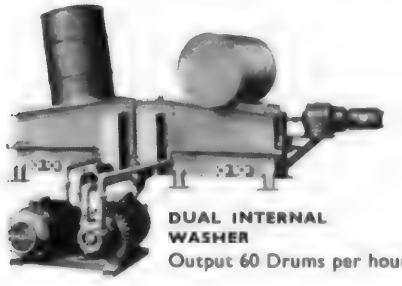

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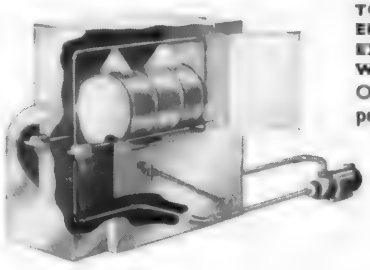

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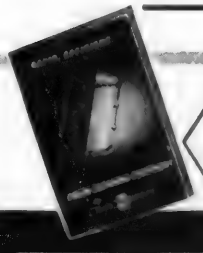

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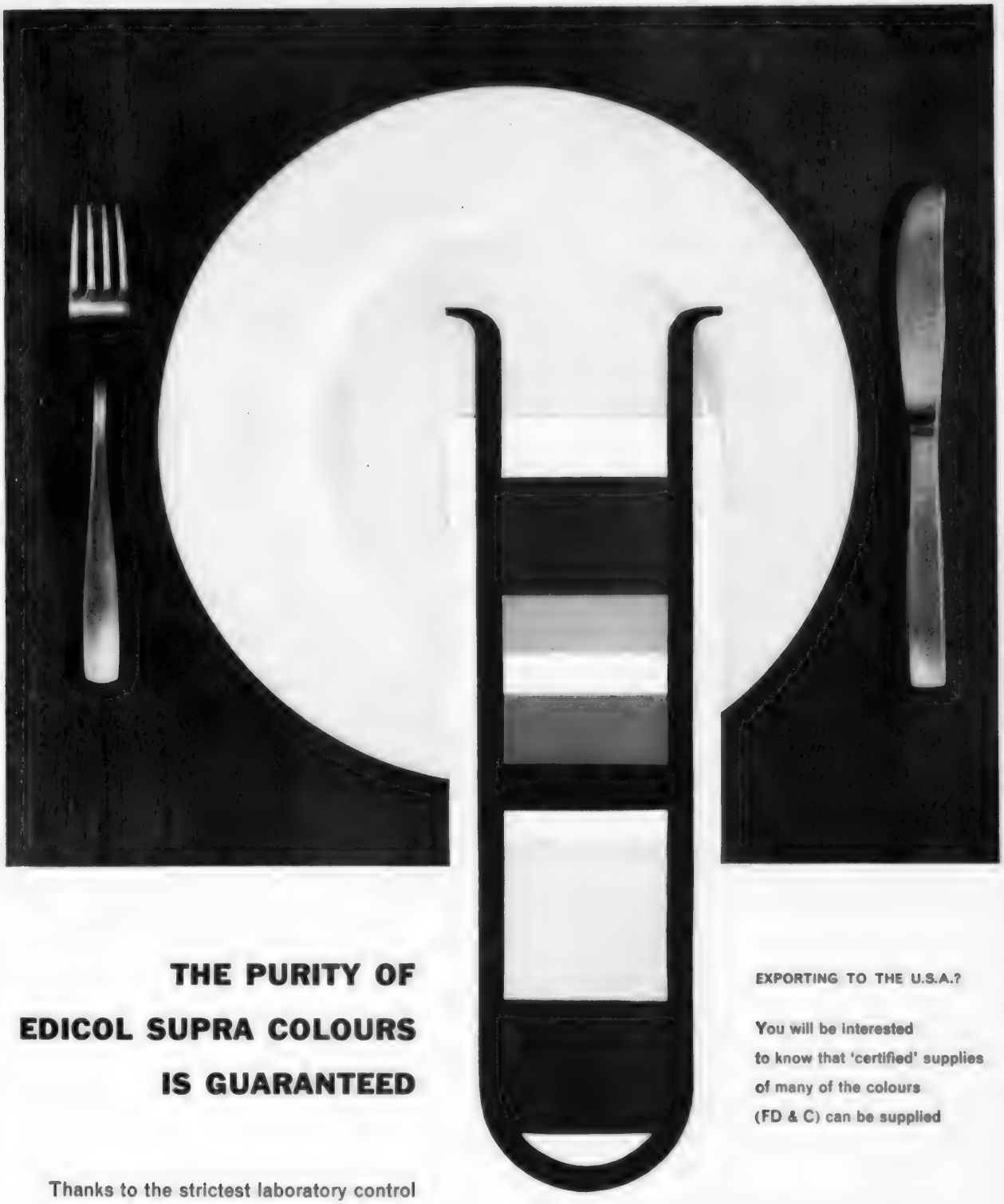

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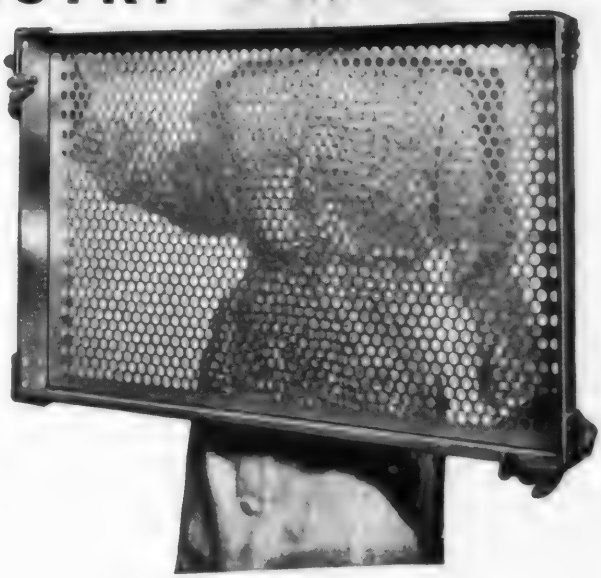

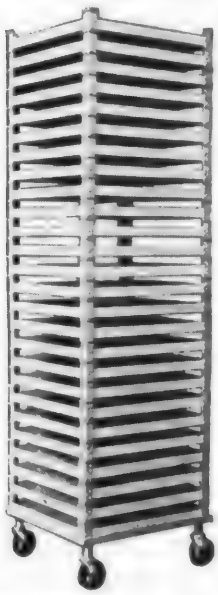

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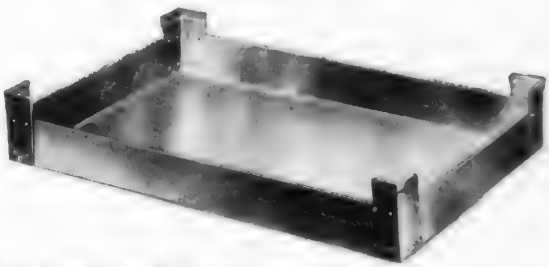

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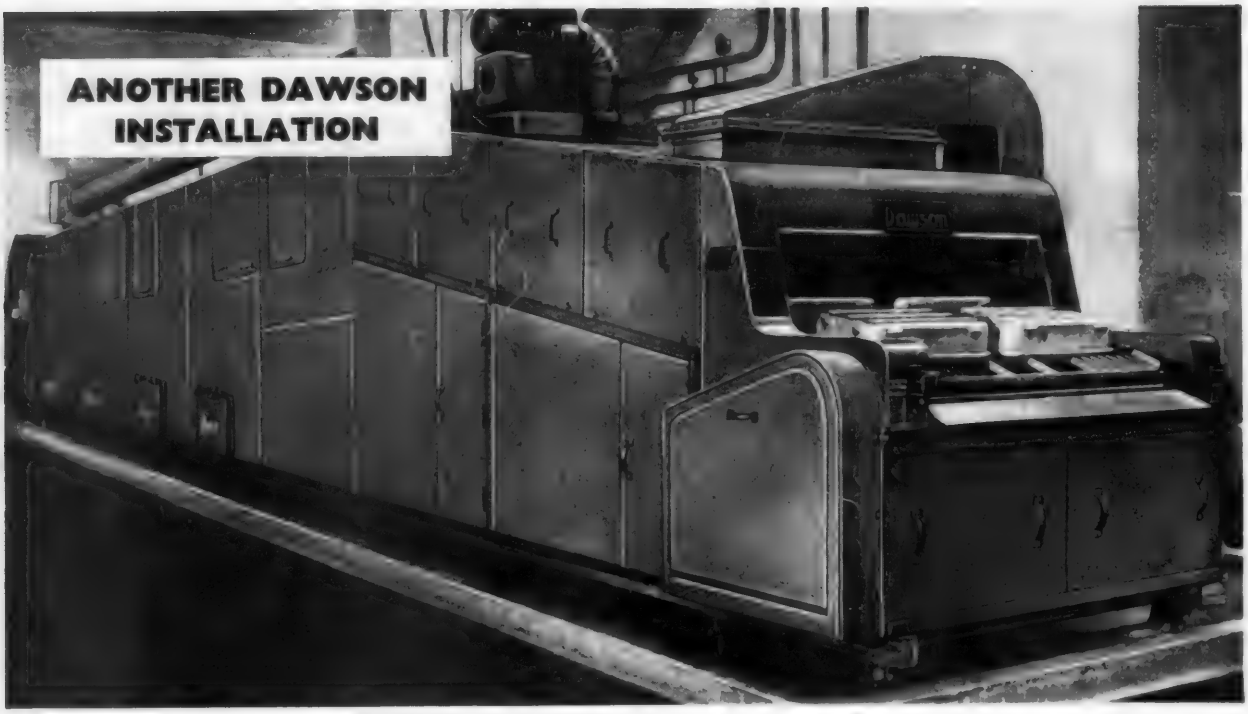

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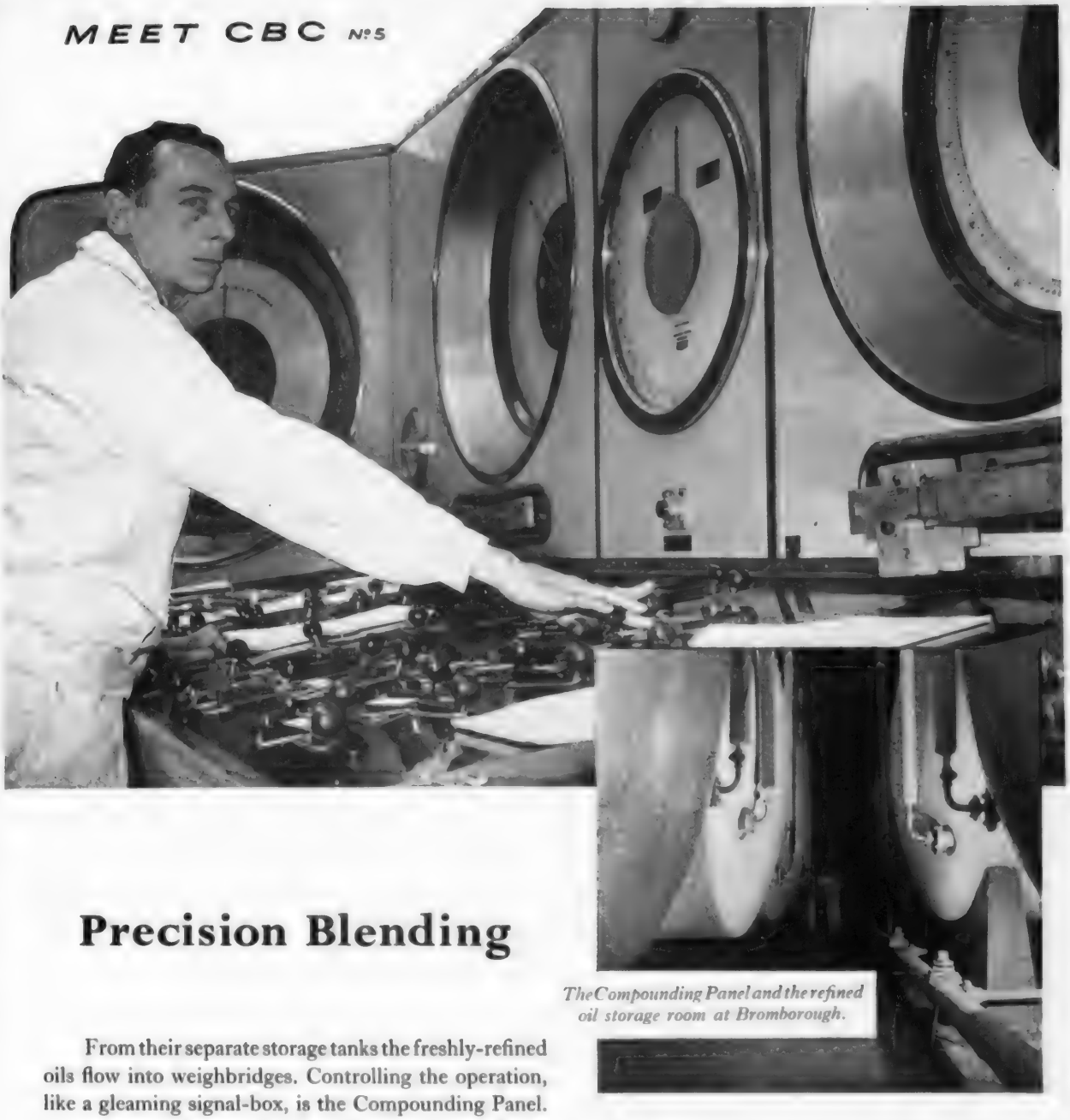

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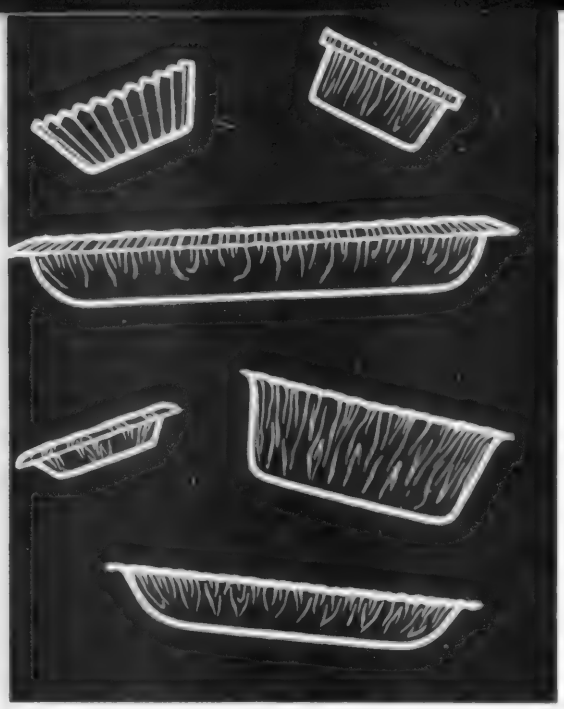

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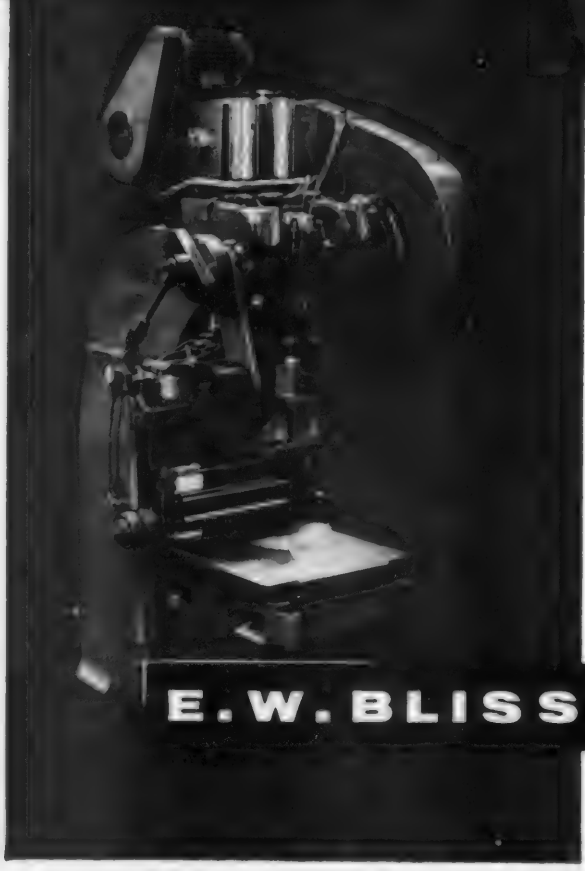

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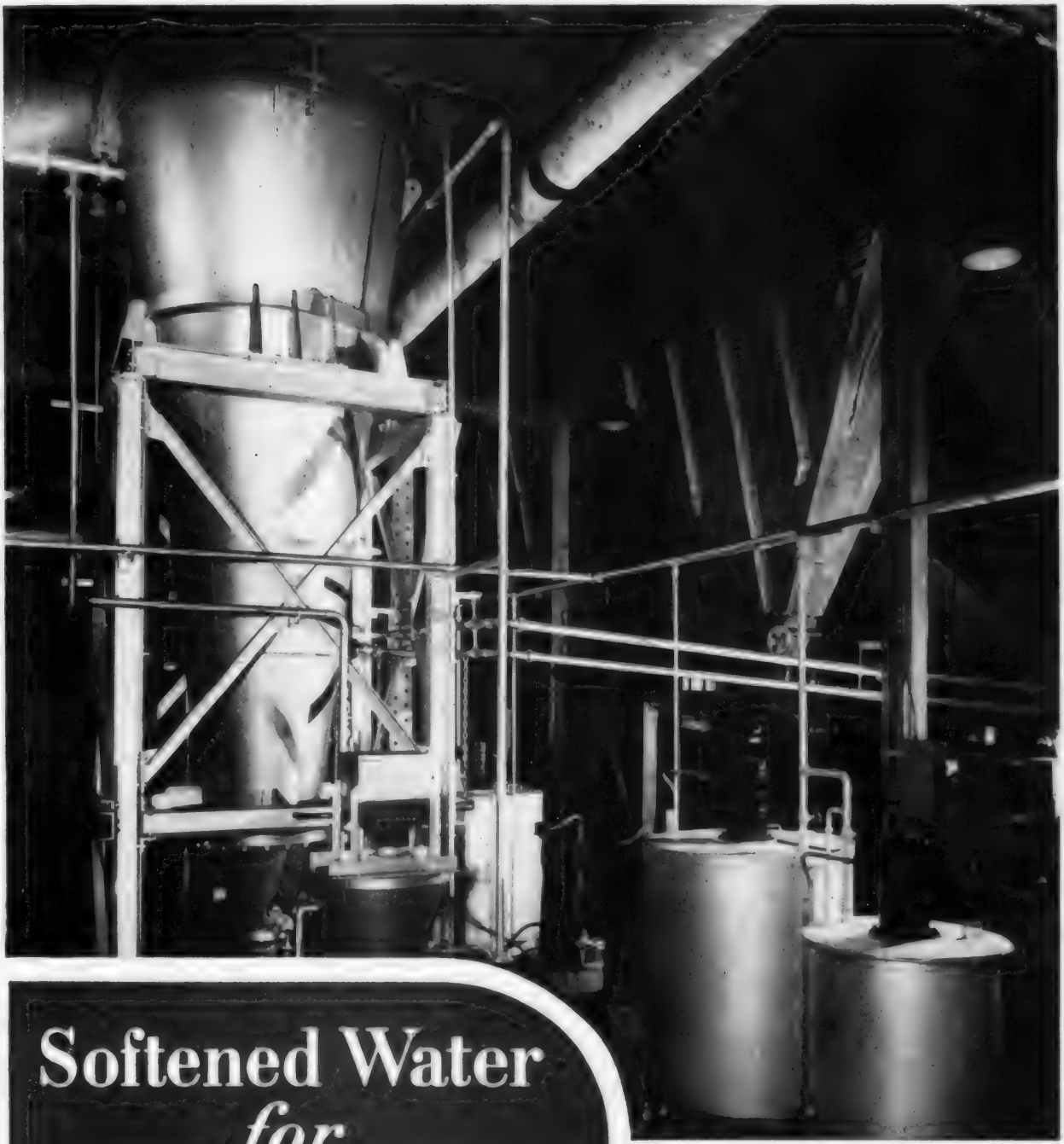

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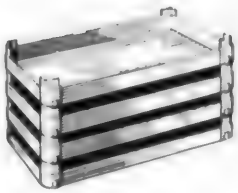

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FOR S.P.D. LIMITED...

The S.P.D. Ltd., Depot at Chelmsford, Essex.
Consulting Engineers: Frederick S. Snow and Partners.
Colt Equipment: 80 S.R.2060 Natural Extractors.

In S.P.D. depots throughout Great Britain, the complex ventilation requirements of these warehouses are being met by Colt Natural Ventilation systems.

The installation of Colt S.R.2060 Ventilators, shown above at the Chelmsford depot, is the Colt solution to an intricate problem concerning the relationship between ventilation and structural insulation ; both of them essential to the products stored.

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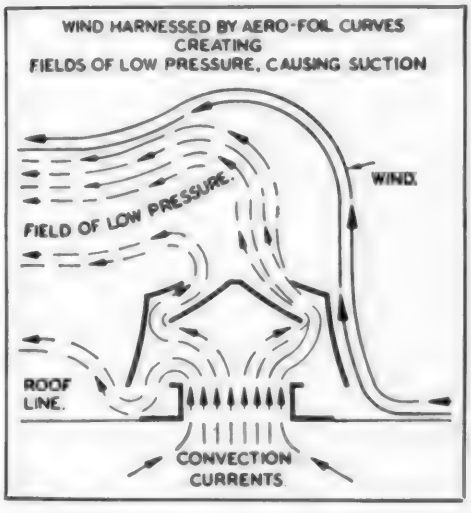
Let COLT solve YOUR problem.



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G.686

Don't let food pests eat into YOUR pocket...

control them with PYBUTHRIN Insecticides

TONS of foodstuffs are condemned, millions of pounds wasted annually, because of the inroads made by food pests. Don't let insect pests waste *your* money. There is a Cooper "Pybuthrin" Insecticide to control them. "Pybuthrin", which contains African pyrethrum synergised with piperonyl butoxide, is the basis of these insecticides. They are deadly to insects, prevent the building up of infestations wherever food is stored and processed but, at the same time, are non-poisonous and completely safe in use. If you have an insect problem on *your* hands, consult Cooper's. Write for free advice and details of "Pybuthrin" insecticides!

It's death to the Cacao moth

The Cacao Moth (*Ephestia elutella*), which attacks cocoa beans, dried fruit, chocolate, etc., can be successfully controlled by space spraying with "Pybuthrin" Insecticide No. 44. Normal rate of application: ½ pt. to 15,000 cubic feet for space spraying.

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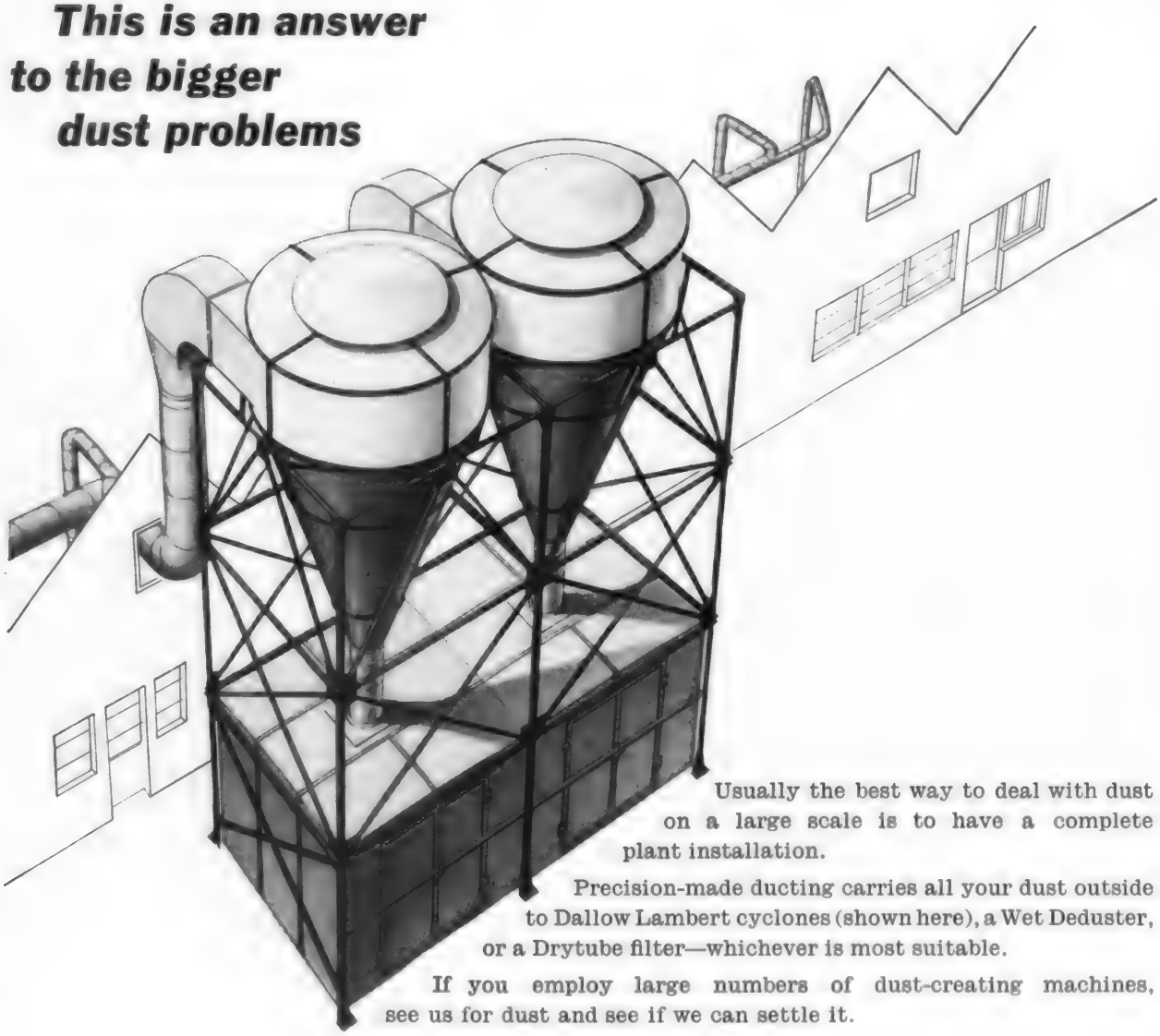

Usually the best way to deal with dust on a large scale is to have a complete plant installation.

Precision-made ducting carries all your dust outside to Dallow Lambert cyclones (shown here), a Wet Deduster, or a Drytube filter—whichever is most suitable.

If you employ large numbers of dust-creating machines, see us for dust and see if we can settle it.

see us for dust

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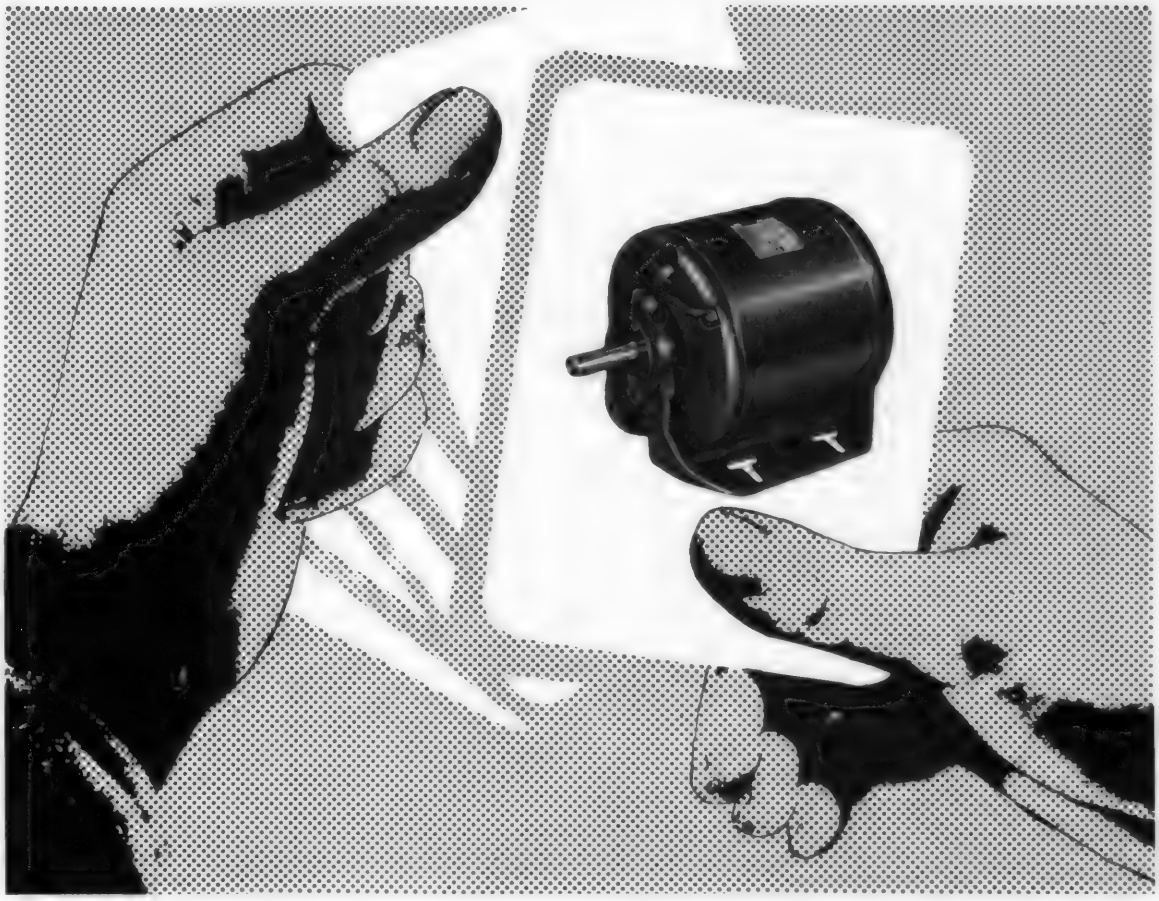

An entirely new suit in F.H.P. motors

You cannot interfere with a production line every time a new idea or a possible improvement to the product turns up. You have to let these ideas accumulate and then, in one clean sweep, incorporate the lot—or as many as are compatible—in a new design.

That is what has just happened to Crompton Parkinson F.H.P. motors. The new Series 'T' is the result of such an accumulation of experience, ideas, possibilities suggested by new materials, and so forth, that has been building up for years. The new motors are better looking, better ventilated and, if possible, even more reliable than their very popular predecessors.

Here are some of their points:—

1. Strength Rolled steel welded carcase supported by continuous full core diameter; short, stout endshields of extremely rigid design.

2. Squirrel Cage Rotor Cast under closely controlled conditions with subsequent heat treatment resulting in maximum torques and uniformity in performance.

3. Centrifugal Gear and O.C. Switch Completely new long-life design with minimum number of working parts; robust, quiet, positive and troublefree in operation.

4. Bearings 'Marathon' Mark III Bearings. These contain enough oil absorbed in felt specially made for the job, for two years running under normal operating conditions.

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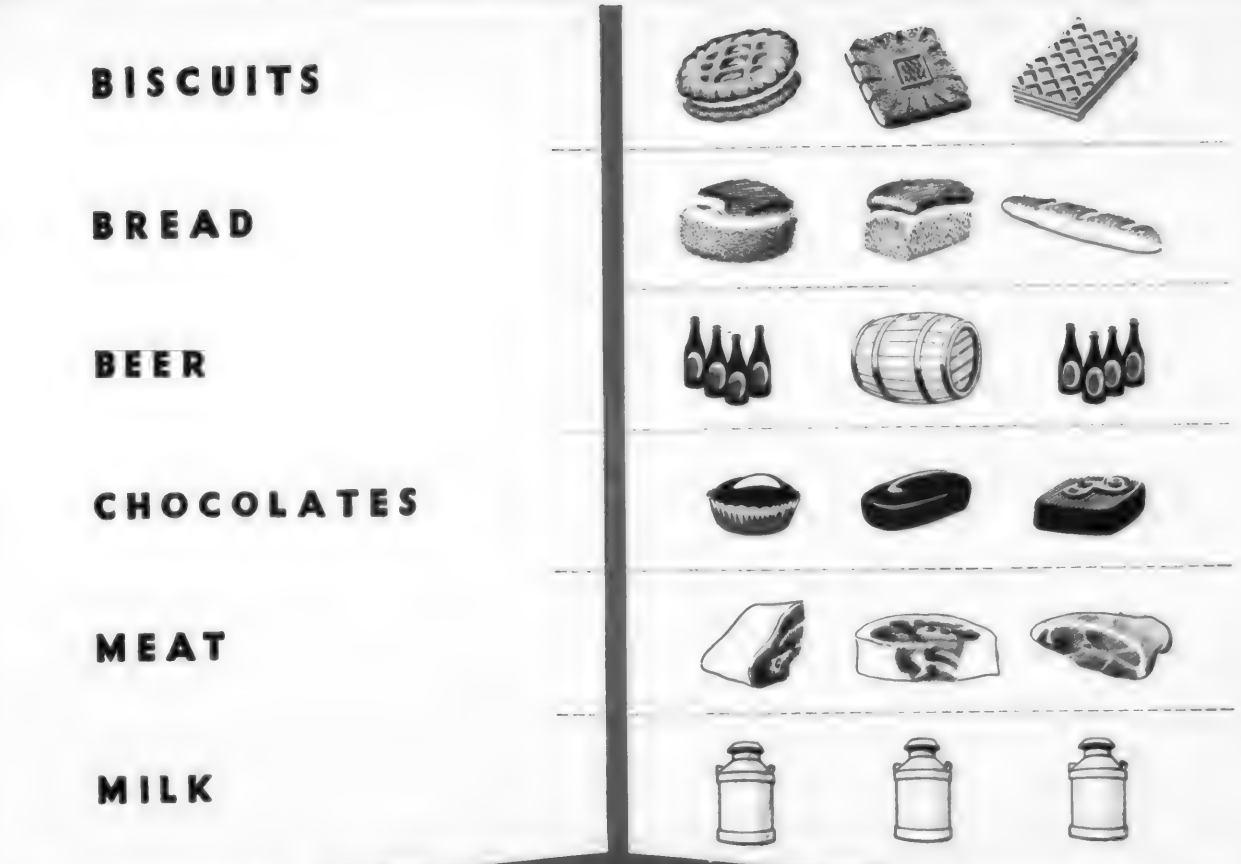

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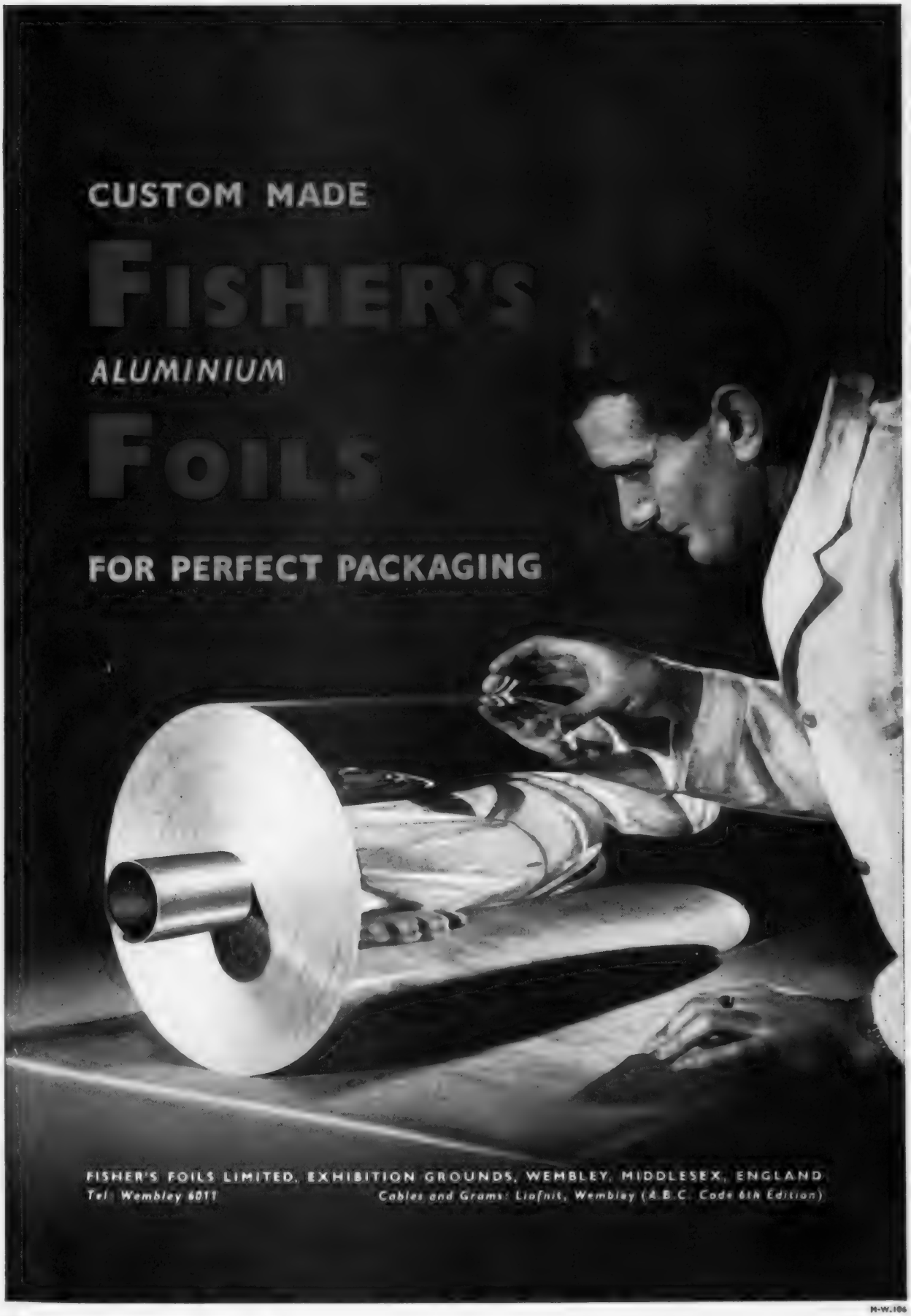
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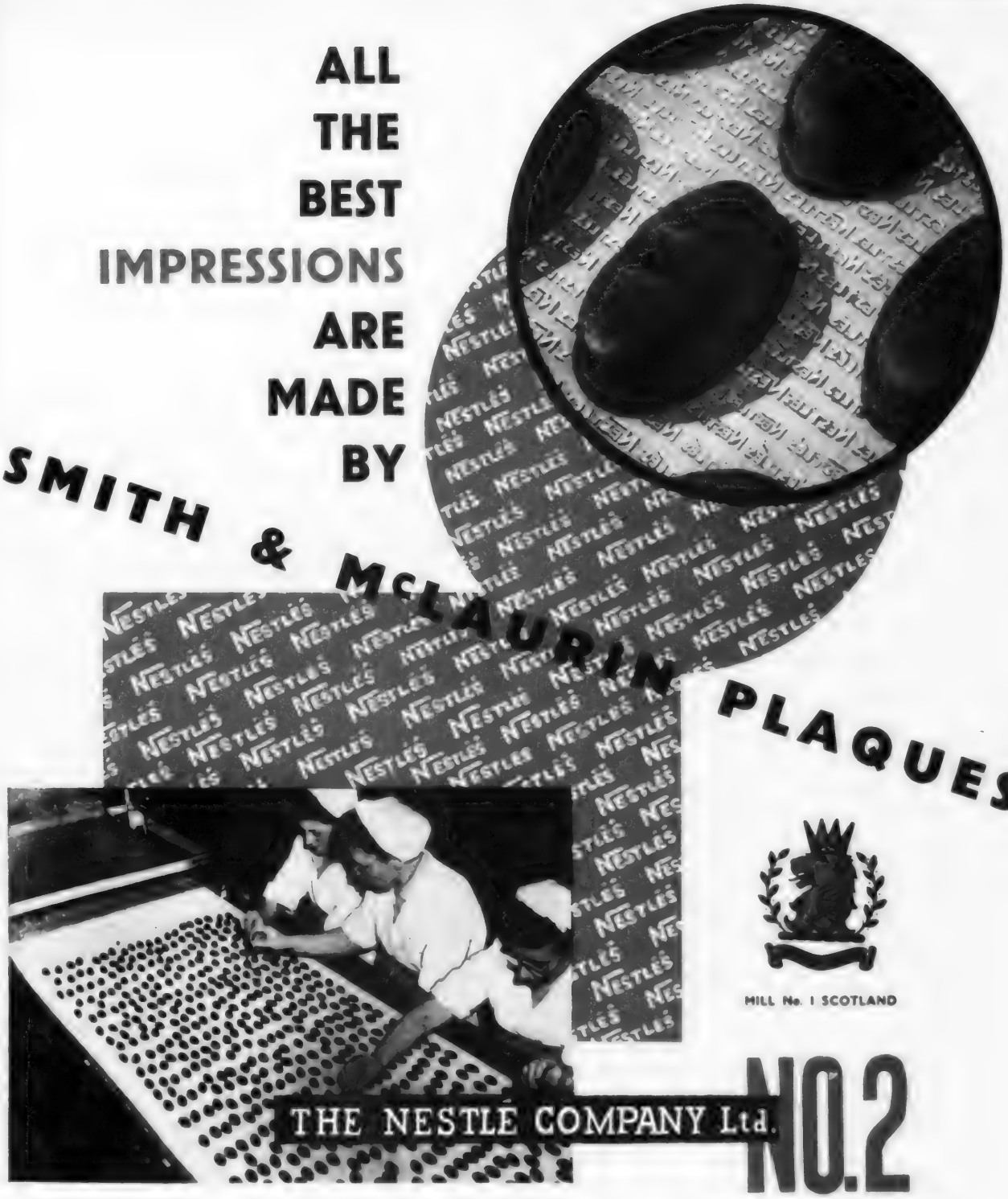

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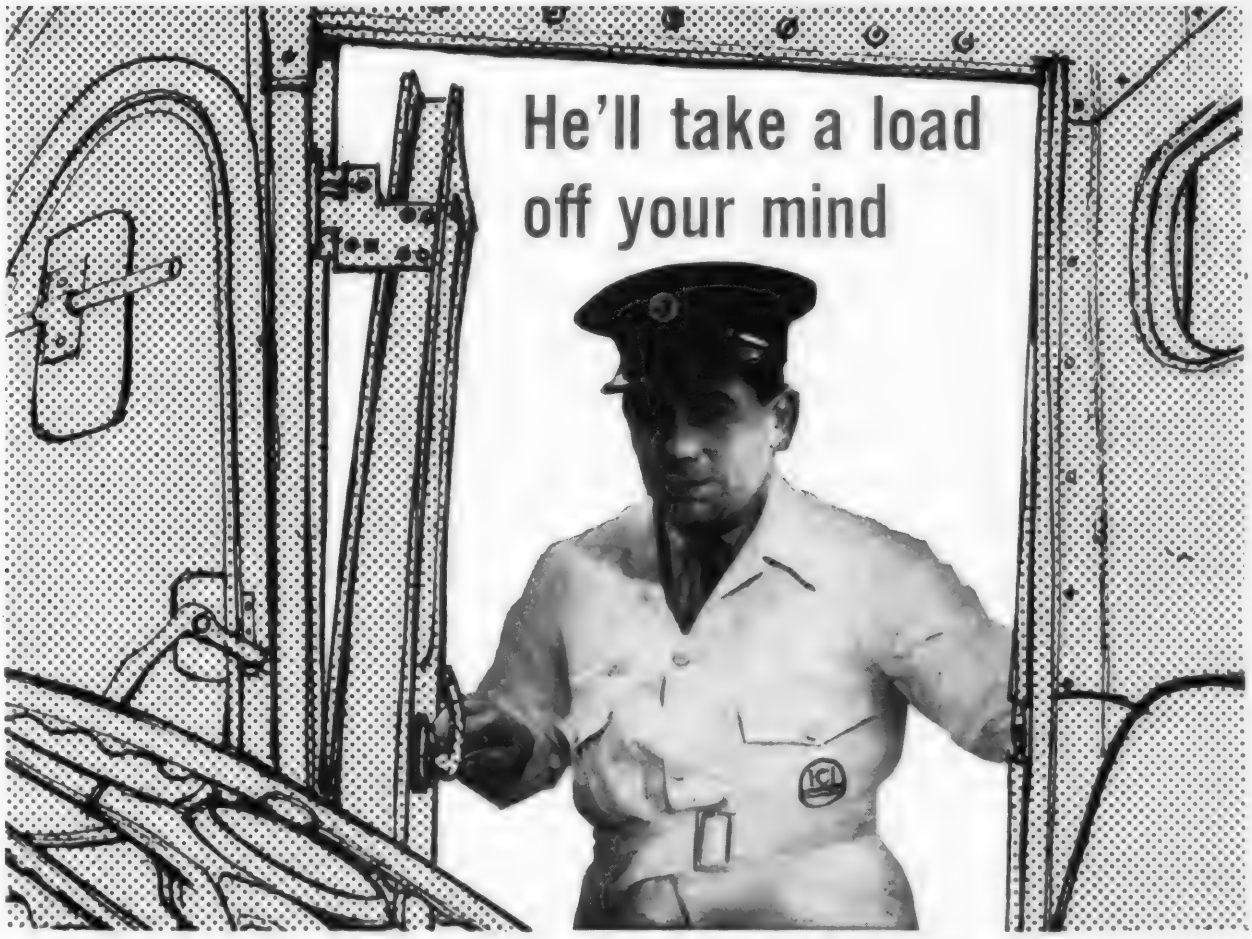

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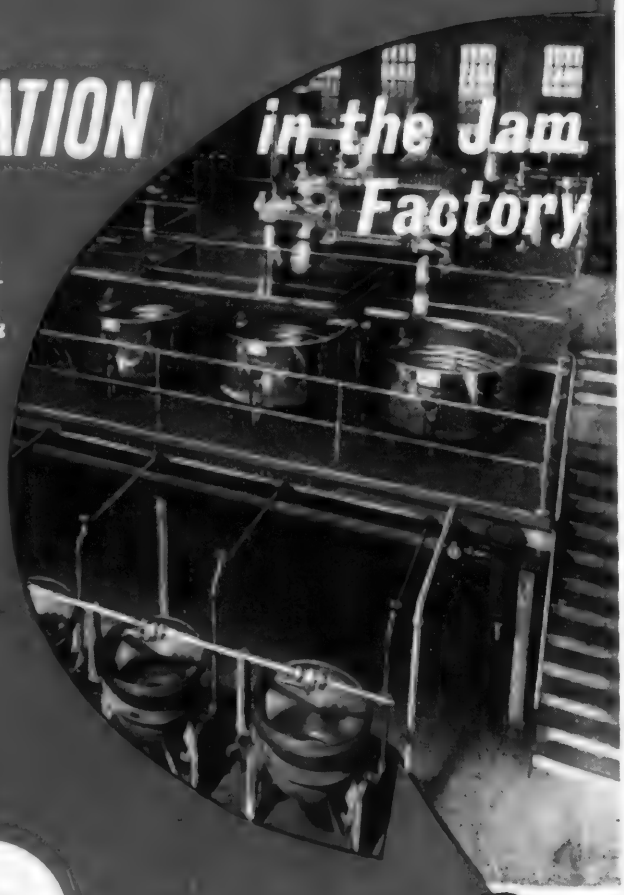

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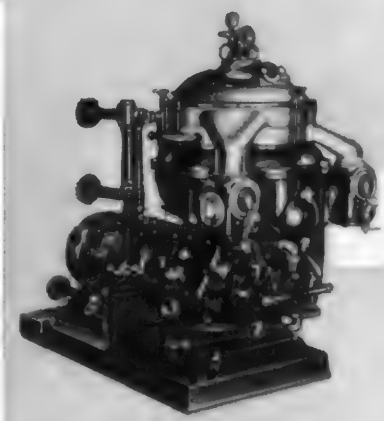

De Laval PX209·15S Purifier for oils etc.

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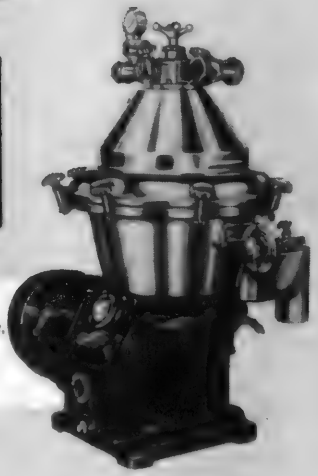

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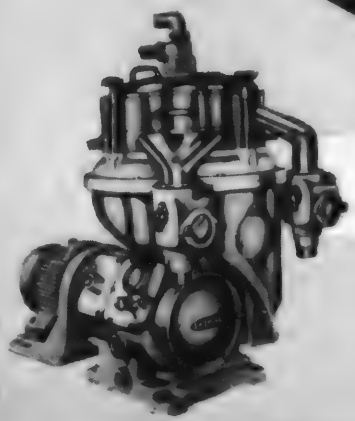

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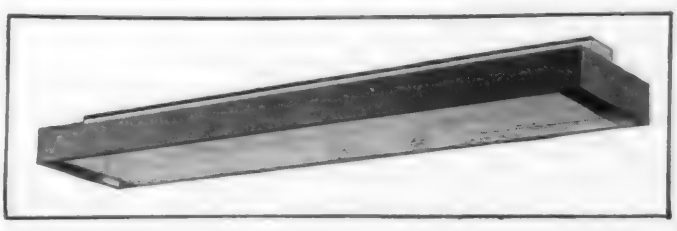

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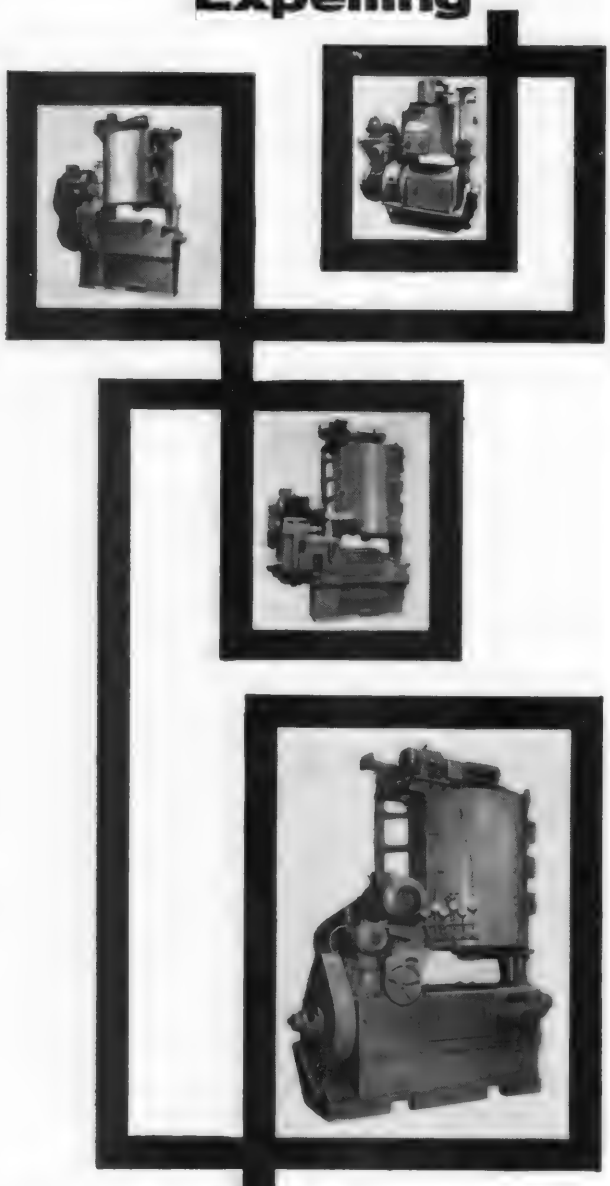

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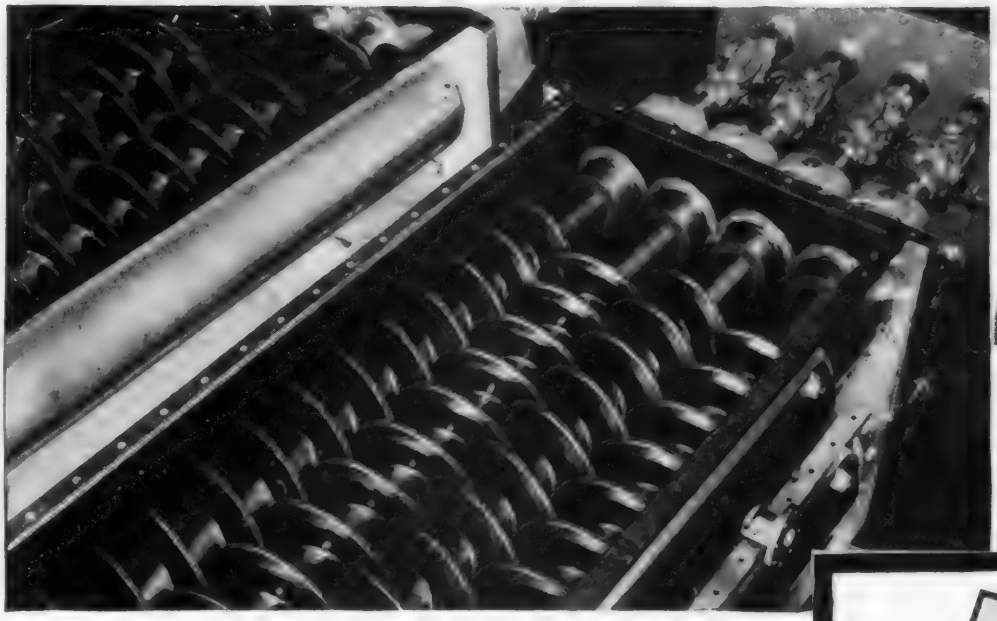

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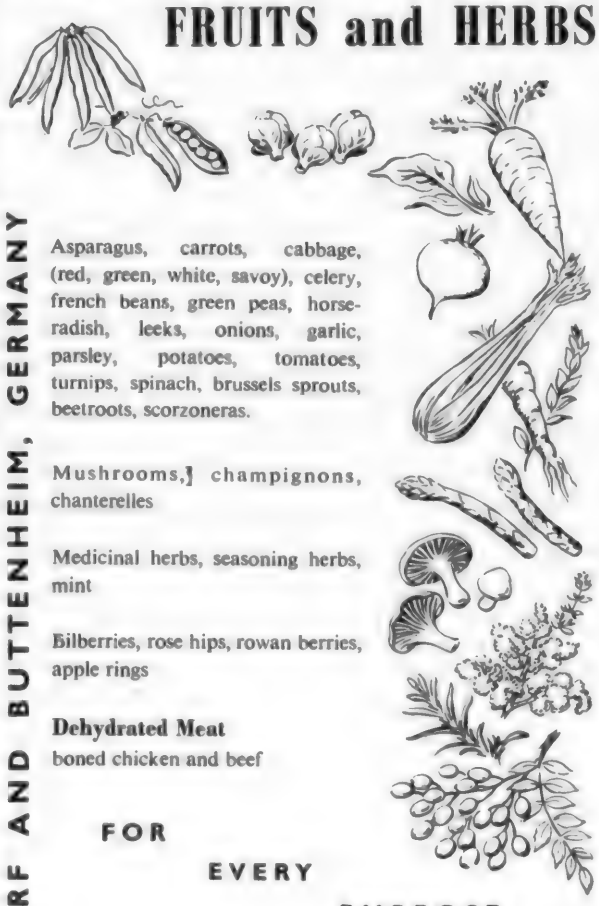

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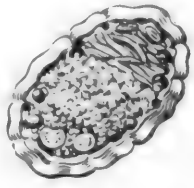

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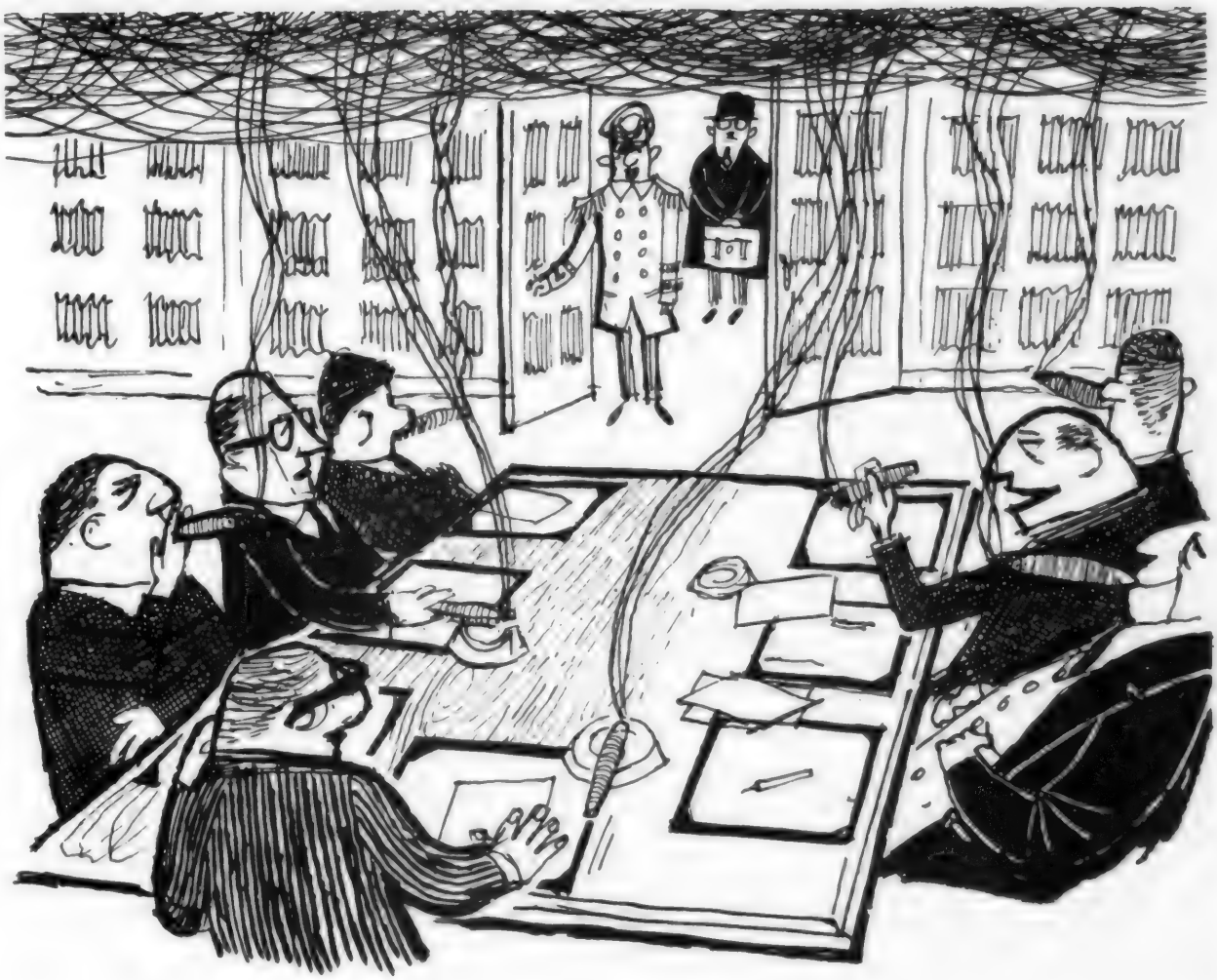

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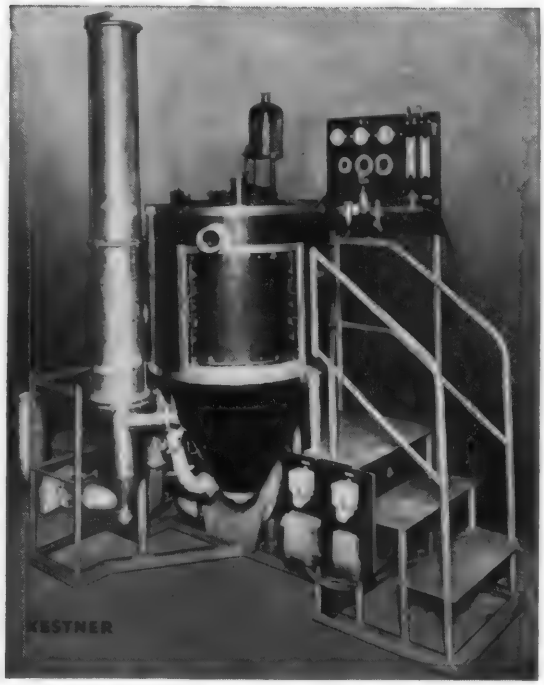

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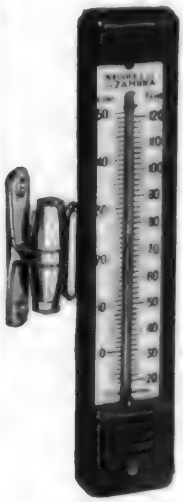

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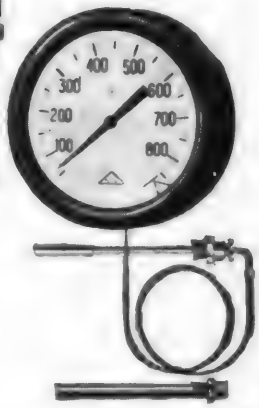

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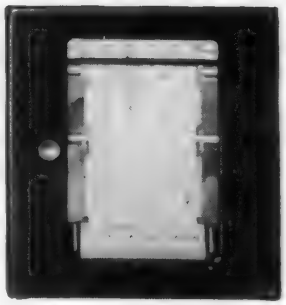

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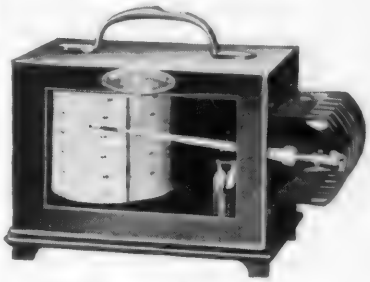

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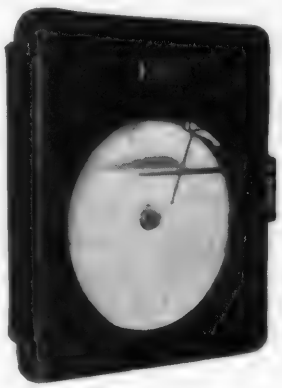

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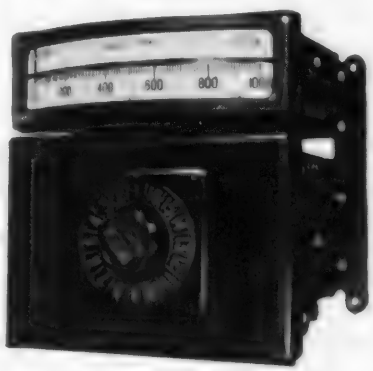

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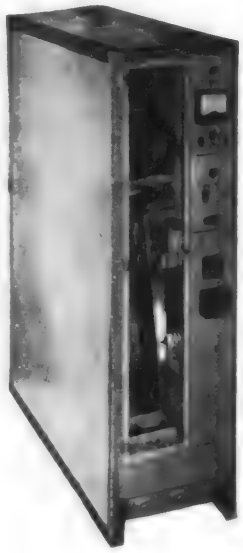

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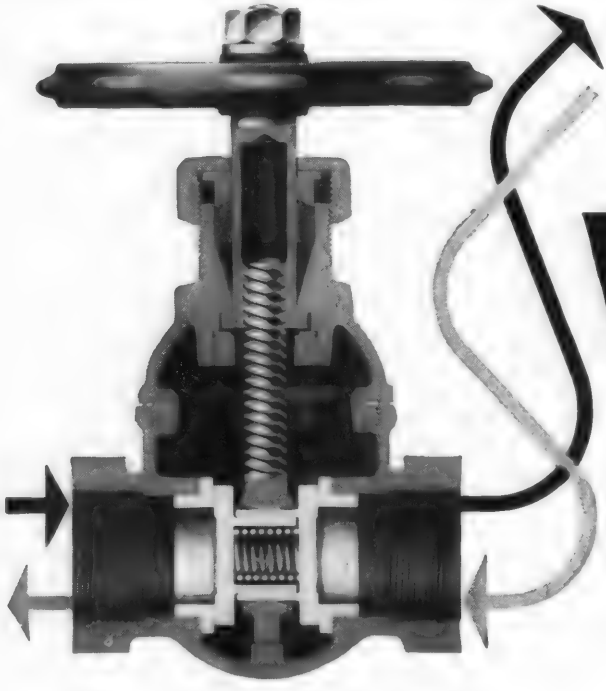

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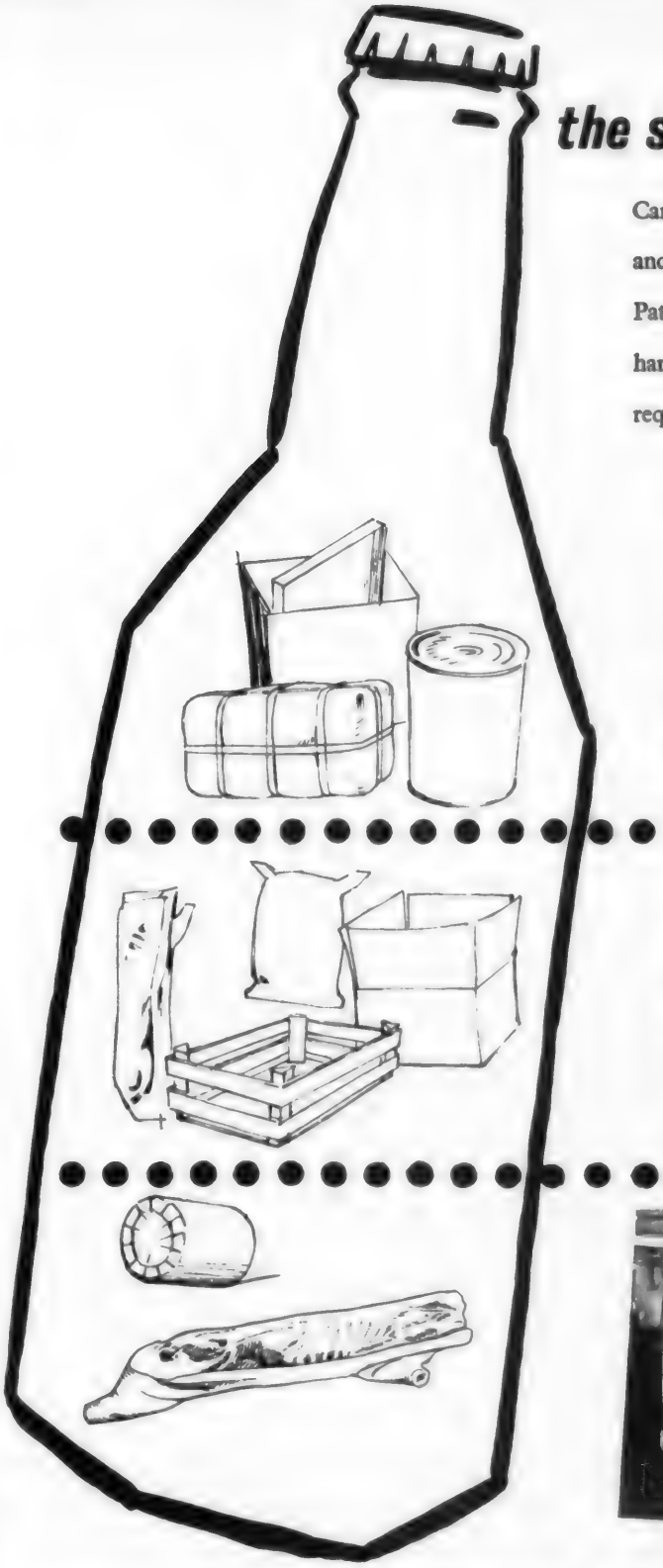

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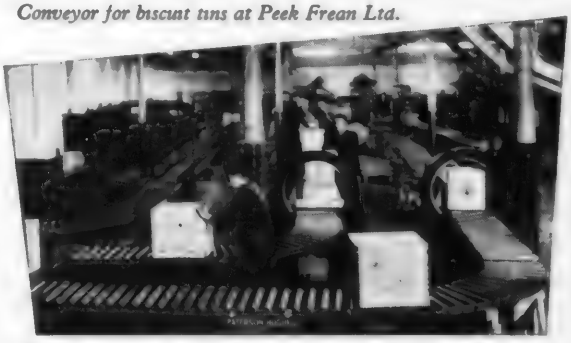

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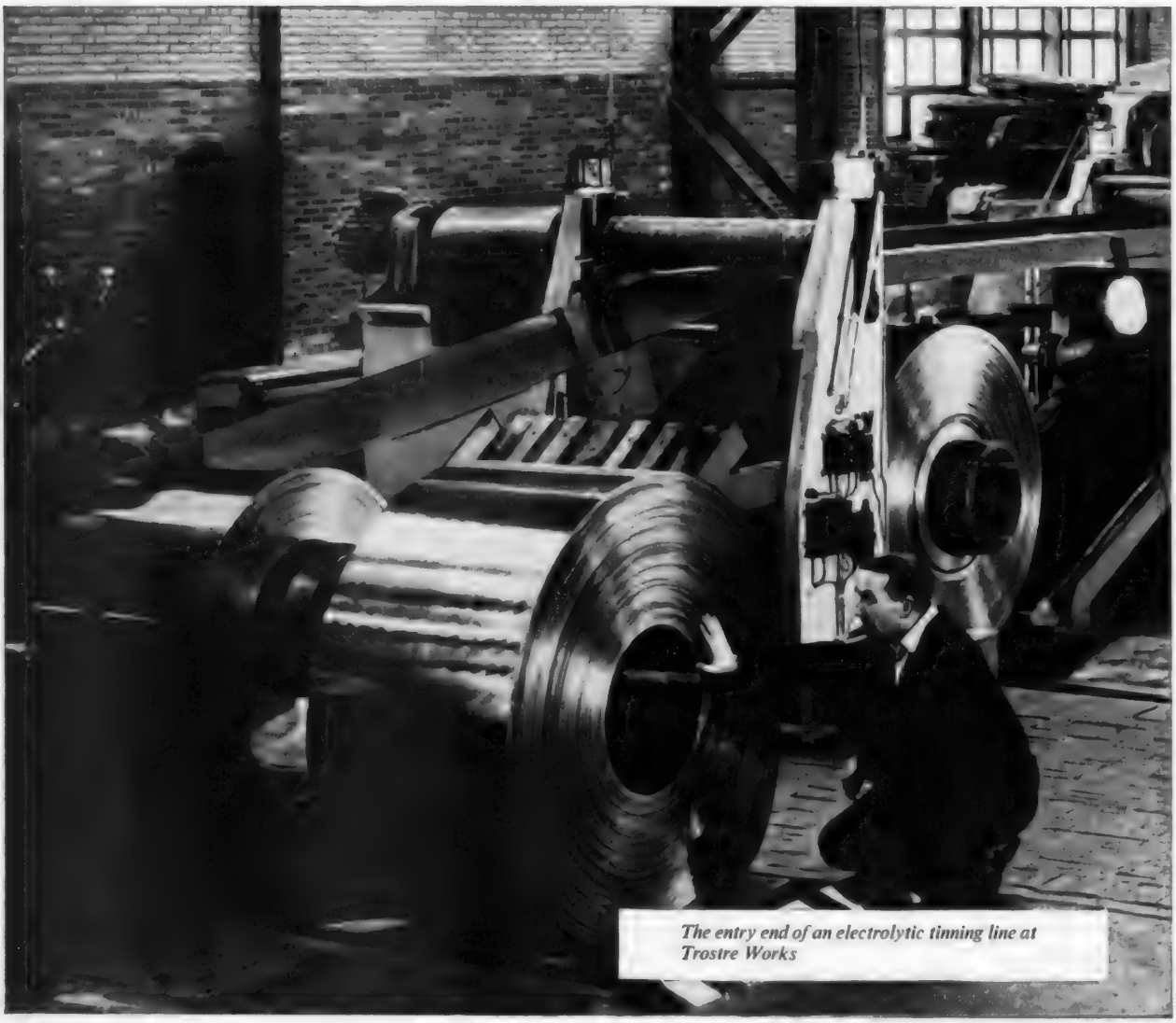
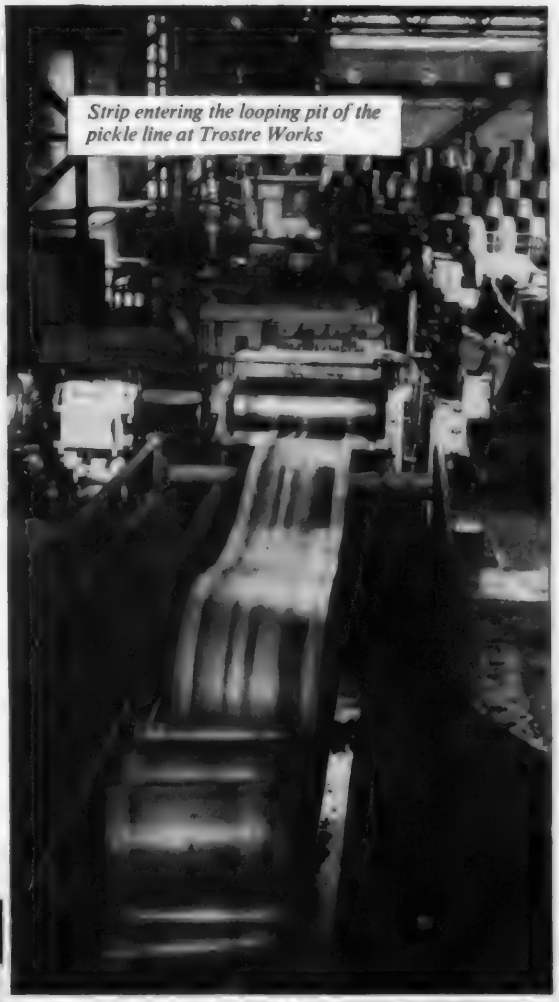


The entry end of an electrolytic tinning line at Trostre Works

Tinned strip entering the cutting and classification section of an electrolytic tinning line



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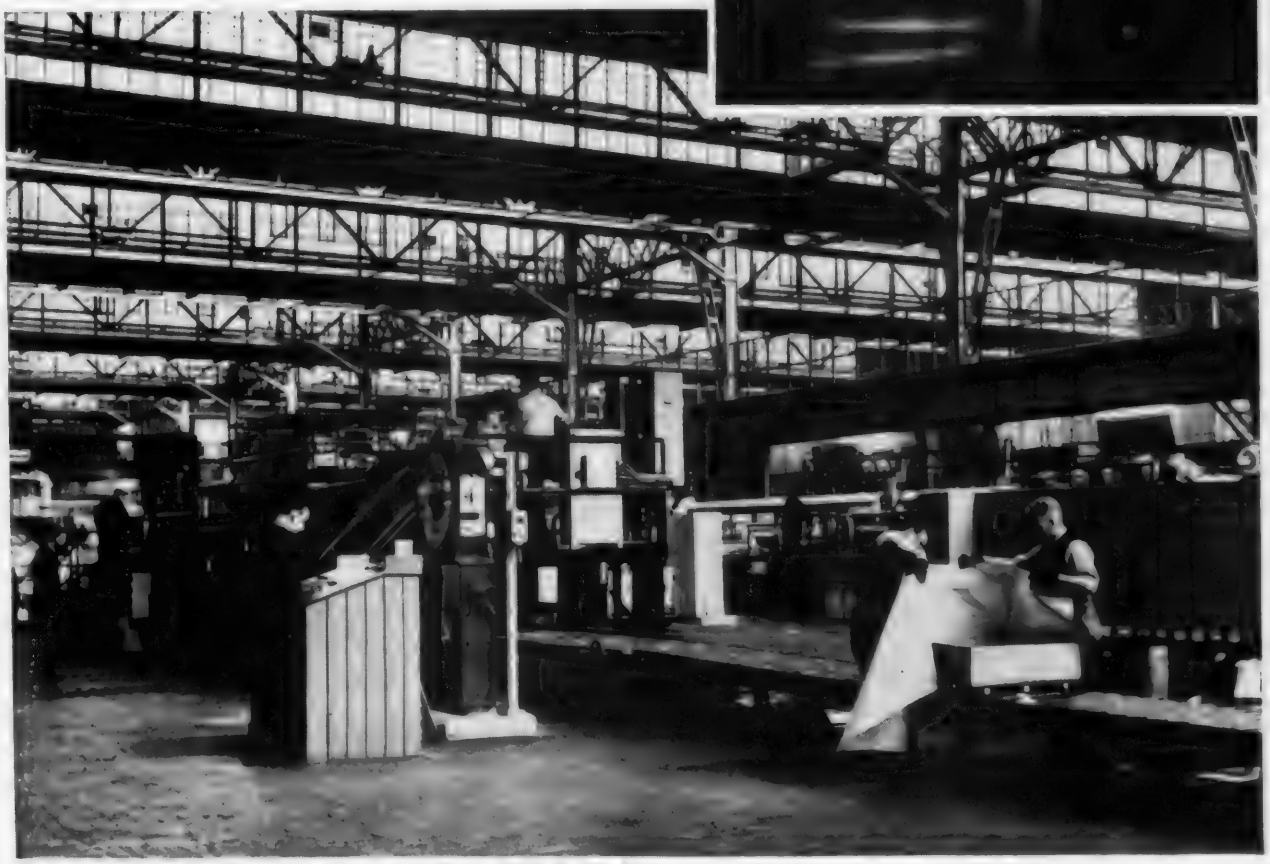

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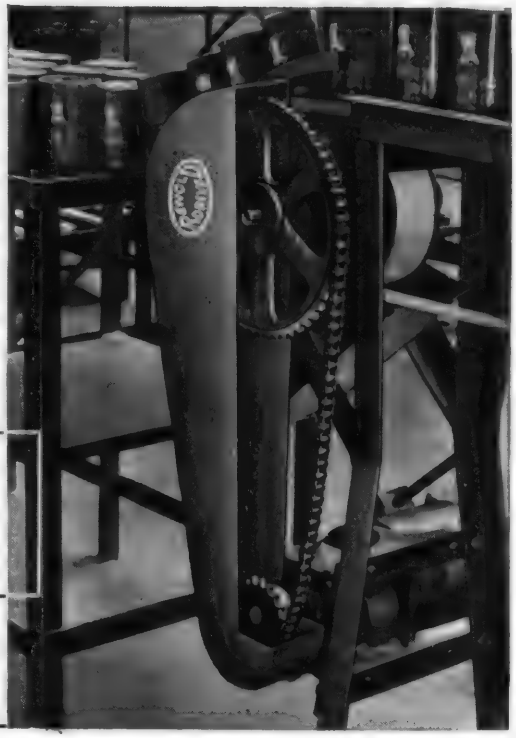

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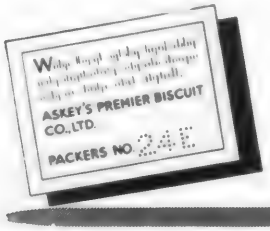

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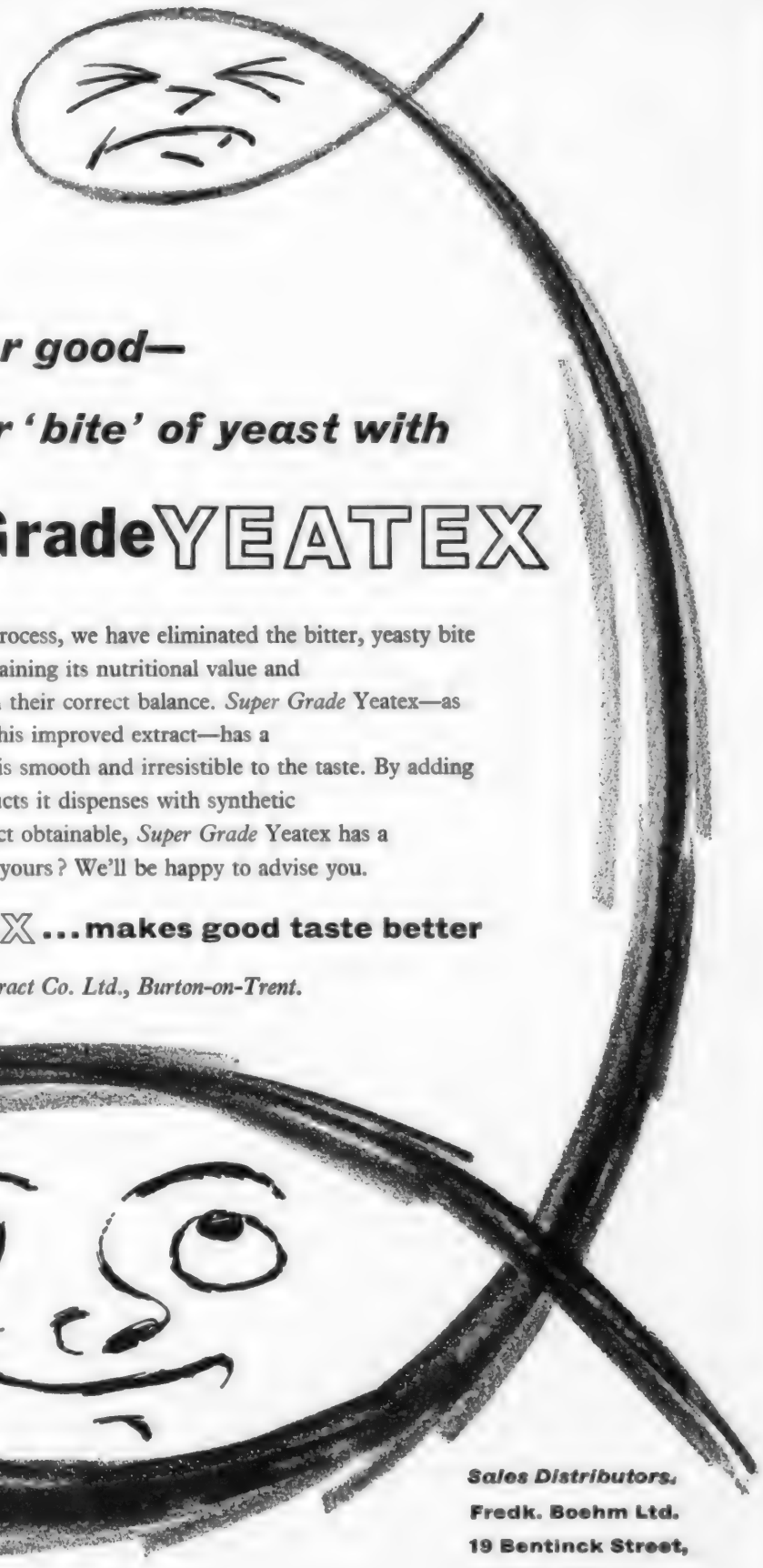

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FOOD MANUFACTURE

Vol. XXXIII, No. 7 July 1, 1958

Research in industry

"It is 40 years since the first co-operative research association was formed in a British industry and during that time new bodies have come into being at an average rate of more than one a year." So opens the latest review of the work done by industrial research associations in the Government scheme, which is now available.* The report goes on to say that there are now 39 associations of this kind, together with 7 research councils on the same pattern. Total income of these associations during the period reported (1955-57) was £6 million, and D.S.I.R. grants amounted to £1½ million. Grants for the period were assessed on established principles and within existing financial limits, pending a comprehensive review of grant policy which the Council for Scientific and Industrial Research is now making.

The food industry is well served by the research associations, and the British Baking Industries Research Association and the British Food Manufacturing Industries Research Association have both recently expanded their liaison facilities in an effort to get over better to members of the industry just what can be done to help them. As the report of the B.B.I.R.A. very aptly remarks, "In any industrial research association, a realistic balance needs to be maintained between the proportion of effort that can be allotted to basic research, which is the insurance for the future, and that concerned with day-to-day technological problems. Coupled with this is the problem of ensuring that new knowledge is applied at a distance."

The liaison units of the research associations, as well as explaining the general functions of the associations can do much to help in the maintenance of this balance. They can explain to members of the association the value of the basic research being carried out —which is by no means always fully appreciated; they can help in the assessment of just which technical problems are most widespread throughout the industry, and therefore require the most urgent attention; and they can ensure that full use is made of technological developments made possible by the research association or by scientific discoveries elsewhere. The B.F.M.I.R.A. reports that after visits from its Liaison and Advisory units, firms invariably tend to make greater use of other services available to them by keeping in closer touch by correspondence, and this increase in liaison activities should do much to ensure that better use is made throughout the food industry of the money spent on research.

* *Research for Industry*, 1956-57. H.M.S.O. for D.S.I.R. 7s. 6d. net.

European Food Codex

World trade in processed foods is not helped, to say the least of it, by the multiplicity of national food standards in force throughout the world, and any effort to establish international standards is worthy of all the support it can get. One of the latest schemes to this end is that for the establishment of a European Food Codex, and interested parties in this plan held their first meeting recently. The meeting was organised in Paris by the Commission Internationale des Industries Agricoles and was attended by delegates from 20 European Governments and observers from the U.S.A.

The first task achieved by the delegates was the drafting of the aim of the Codex, which may be stated in brief as being the establishment of standards which will guard the health of the consumer, clearly establish the nature of various products and of the processing techniques used in their manufacture, and ensure the use of fair trade practices between the countries accepting the Codex. To this end, the Codex will exclude the use of all substances judged to be harmful to health, as well as all practices judged to give a false impression of the value of the commodities under consideration. Definitions of various products and of acceptable processing techniques will be formulated, and methods of control and acceptable tolerances will be established.

In order to further these aims, a permanent council (Conseil Européen permanent du Codex) has been set up, under the presidency of Dr. Frenzel, the Austrian government representative, and the general duties of the secretariat have been adopted by the Commission Internationale des Industries Agricoles.

The difficulties facing the council will clearly be those which have faced other bodies of this kind— the securing of agreement on actual facts and figures. The official delegates from every country will at some

stage be called on to agree to standards at variance with the ones in force in their own country, and it is extremely unlikely that individual governments will be imaginative enough to modify their own standards to conform with the general view of what is desirable. Without such modifications, however, it would appear that the Codex will either be completely divorced from reality, or will descend into a sort of lowest common denominator of the various national standards in force. With the prospects of increased European trade offered by the Common Market and the European Free Trade Area, this would be a great pity, and it is to be hoped that delegates will be able to establish realistic standards, and that individual governments will do everything in their power to make these a widely accepted reality.

Changed eating habits

SCOTLAND still continues to be a land of cakes and oatmeal; Wales still preserves a conservative taste for butter in preference to other fats; the North-East maintains its long-standing reputation as a champion of home baking but tempers this indication of domesticity with a strong *penchant* to fish and chips. So said Mr. Norman C. Wright, Chairman of the National Food Survey Committee, and Chief Scientific Adviser (Food) at the Ministry of Agriculture, addressing the Royal Society of Health in London recently.

Yet despite these and other indications of continued regional preferences for certain foods, it was clear from Mr. Wright's remarks that the pattern of food purchasing throughout the country is slowly changing. Thus, over the six years covered by a recent survey, the consumption of canned foods had increased by anything from 50% in respect of fruit to 100% in respect of canned meats and vegetables. Sales of fruit juices had shown a five-fold increase.

The growth of the quick-freezing industry will also clearly affect the pattern of food sales in the coming years. Although this industry was as yet too small to influence feeding habits on a national scale, said Mr. Wright, there had already been a phenomenal increase in the sale of quick-frozen vegetables, which had quadrupled in six years.

Supplies of quick-frozen foods are still only a fraction of those available in the U.S.A., but as the use of domestic refrigerators spreads we can expect frozen foods to have an increased effect on the eating habits of the nation.

Pre-packaging of foods is also expanding rapidly, and Mr. Wright quoted estimates that 5% of all fresh meat is now pre-packaged in trays or films. The pre-packaging of fish has developed along similar lines, and the pre-packaging of fresh fruit and vegetables has increased in the last four years from 100,000 packs to no less than 200 million.

Increased consumption of food outside the home has been attributed to several general causes, but Mr. Wright made interesting observations on the possible effect of the luncheon voucher scheme on this trend. He reported that about 6,000 business concerns were now operating this scheme, and that some 750,000 coupons were issued each week. Over the past two years the turnover has doubled, and although this almost certainly does not represent a direct addition to the number of meals taken outside the home, the scheme obviously favours increased eating out.

Standards for cheese

A "PRELIMINARY investigation" has been started by officials of the Ministry of Agriculture into a proposal that the minimum fat and other contents of cheese should be laid down by statutory Order. This is revealed by a Ministry spokesman in a letter to the County Councils' Association.

It is to be decided whether there is a *prima facie* case for reference to the Food Standards Committee. There are three separate aspects under consideration, one being the present voluntary grading scheme for domestic hard cheeses. The others are soft and cream cheeses, and imported cheeses.

According to the Ministry spokesman, the department is assembling as much evidence as possible "bearing on the possible need to protect the purchaser by means of statutory standards." The Ministry is seeking further evidence of the need to lay down the minimum fat content of soft and cream cheeses and is seeking the co-operation of local authorities in obtaining a note of the composition of cheeses at present on the market. It also wants any evidence available that the customer is being misled.

So far as imported cheeses are concerned, the Ministry is endeavouring to obtain up-to-date information on the statutory standards in force in the countries of origin.

Says the Ministry official: "It may be that the dissemination of this information among enforcing authorities in this country would serve the purpose."

Chicken as cheap as beef

NEWS of recent breeding trends is given by Scottish poultry specialists, who found that in the past year there has been a growing demand for Exchequer Leghorns bred with Light Sussex, and White Leghorn with White Wyandottes, as well as for the traditionally popular White Leghorn cross with Rhode Island Reds, and Brown Leghorn with Light Sussex. In an endeavour to improve breeds a firm in Aberdeen has been importing more and more eggs from Shetland to introduce a fresh strain.

Speaking of future prospects, a poultrykeeper at Dinnet said that while efficient producers would certainly stay in business, the less efficient would

have to give up. A trend which had taken place in the past two years, so quietly that it had almost gone unnoticed, was the increase in popularity of cockerels. Formerly they had been got rid of as surplus, but now they were regarded as desirable. This was due to the development of the broiler industry, he said.

He, too, touched on the question of breeding. "There are a considerable number of poultry stations in the North-east co-operating very closely with geneticists to produce better quality stocks in the interests of efficient egg production." Confidence in the future was expressed by the owner of hatcheries in Wick. "We have almost twice as many orders as this time last year," he said, "and we think this prosperity will continue." He expected that the depression in the pig market would mean that more farmers would go in for poultry.

Also confident in the future of the poultry industry was a Bucksburn firm, where they said: "People are becoming more poultry-minded and are now beginning to realise they can buy chicken as cheaply as good cuts of beef." This firm sends out 6,000 or 7,000 chickens per week, and its total poultry output is about 15,000 per week.

Plants can suffer heart attacks

ENORMOUS losses are sustained by farmers throughout the world from the ravages of Fusarium wilt disease which attacks a wide variety of crops, including cabbages, peas, tomatoes, bananas, and other important food plants. At the 133rd national meeting of the American Chemical Society, held recently in San Francisco, news was given of research work which is now being carried out on the cause and prevention of this disease. Describing the effects of the disease in plants Dr. Mark A. Stahmann, professor of biochemistry at the University of Wisconsin, likened the effect to that of a stroke or heart attack in humans. The Fusarium organism, he said, may invade the plant's vascular system, and produce an enzyme which attacks some of the pectin in the walls of the vessels. Pectin fragments then get into the vascular stream, where they form gelatinised masses that plug the conducting vessels, just as blood clots block the blood vessels of human beings.

Armed with this new understanding of the nature of wilt diseases, the research workers have now embarked on a study of the more difficult subject of disease resistance. They have studied certain plants which are resistant to the effects of the causative fungi, and shown that although this can exist for several weeks in the tissues of resistant plants, its effects are slight and transitory, and it rather than the host plant eventually succumbs. Although the defence mechanism has not been completely identified, Dr. Stahmann stated that resistant plants seemed to produce in their respiratory system some substance which becomes toxic to the fungi. In addition, such plants apparently failed to produce enough of another enzyme, known as depolymerase, which is responsible for the formation of the pectin plugs. He also noted that the fungi seemed to produce less of the pectic enzymes when grown on the tissue of resistant plants, and suggested that methods of culturing of the parasite on the host plant in this way might provide a valuable tool in the development of resistant varieties. Preliminary experiments had already shown that the strain of Fusarium responsible for Panama disease in bananas grew well on the tissue of the susceptible varieties Gros Michel and Ecuador, but not at all on tissue from the resistant varieties Lacatan and Valery. Poor growth was observed on the tissues of Viamana and Tumoc, which were also classified as resistant.

Expenditure on branded foods

THE results have just been published of an interesting market survey of the sale of branded foods, claimed to be the first of its kind ever made. Based on an enquiry carried out by Odhams Press research division last autumn, the report has been issued by the *Daily Herald* to manufacturers and advertising agents. It covers 68 separate commodities, the expenditure on which represents more than one-third of the total expenditure on food in Great Britain.

In the course of the survey, a nation-wide random sample of 6,242 housewives was questioned, and these were subsequently classified into various groups on the basis of age, social status, etc.

The first part of the report shows the proportion of housewives who buy each of the 68 commodities during a typical week of the period under review. Not unnaturally, bread, sugar, butter and tea had been bought by over 90% of those questioned. Biscuits had been bought by 82%, margarine by 73%, flour by 62%, lard by 58%, canned fruit by 57%, canned peas by 54%, and baked beans by 52%.

The commodities are grouped into nine broad product classes, and part 2 of the report shows the average weekly expenditure on each of these categories. The average housewife was found to spend 30s. 8½d. a week on branded foods, and the report shows the breakdown of this between beverages, canned foods of various types, sugar, preserves and spreads, fats, and miscellaneous items. Average weekly expenditure on foods was shown to be highest (40s. 0½d.) in the 35-44 age group, and lowest (16s. 10d.) in the over 65 group, but this could be accounted for largely by differences in the size of families, the *per capita* expenditure (average, 9s. 11d.) varying by little more than a shilling.

Interesting differences are shown for various commodities, however. Thus, housewives in the youngest group examined (16-24) spend an average of 12·48d. per week on frozen foods, nearly half as much again as the amount spent by the next highest group (25-34). The amount spent on frozen foods apparently decreases steadily with age—an interesting side-light on the conservativeness of our habits. Understandably, the amount spent on frozen foods varies with the social group to which the housewives belong (if social group can be taken as reflecting income), but less understandable are the regional variations. Thus in the Midlands the weekly expenditure on frozen foods averages $7\frac{3}{4}$d., and in London, and the South East and the South West and Wales about one penny less, whereas in the North East and North and in Scotland it is only a little over $\frac{3}{4}$d.

A description of the sample and the methods by which the survey was conducted, together with the questionnaire used, is given in an appendix.

Teaching technical authorship

THE City and Guilds of London Institute has prepared a scheme of syllabuses and examinations in technical authorship. This has been initiated as a result of the findings of the Institute's Exploratory Committee that there is an urgent need for courses and examinations in this subject, that it can be successfully taught in technical colleges, and that examinations in the subject can be conducted by the Institute.

The committee is insistent that those who wish to train as technical authors must have not only the desire to write, but also an adequate technical background based on sound engineering (or other technical) training and experience, and principals of technical colleges are being asked to satisfy themselves as to the students' technical competence before admitting them to the course.

The normal course of part-time instruction will extend over four years, and total study within this period will amount to at least 600 hours. The syllabus covers the technique of writing and editing, and various ancillary topics such as consideration of the various types of technical publication, the work of the technical illustrator, methods of printing and reproduction generally, and economic and legal aspects. The essence of the course, however, will lie in teaching the student to write well. As the subject is a relatively new one, some advice to teachers is being given, and emphasis is being laid on the paramount importance of encouraging students to read widely and of giving them ample opportunity to practice writing on an organised tutorial or syndicate basis.

The Institute will offer an Intermediate and a Final examination, to be held for the first time in 1960 and 1961 respectively. While the course is designed for young entrants, the examinations will also be open to practising technical authors, but such external entrants must satisfy the Institute that their technical qualifications are adequate.

Equipment for smoke control

FROM June 1 last dark smoke and grit must be kept to the absolute minimum, irrespective of whether business will suffer or not. The industrial provisions of the Clean Air Act came into force on that date.

The Act prohibits the emission of dark smoke from chimneys and lays down a fine of up to £100 for *each day* on which an offence occurs. It is, of course, accepted that emissions of this smoke may be unavoidable at times, for example, during soot-blowing or fire cleaning, and provision is made for these contingencies.

What type of equipment should the food manufacturer look for and what action should he take to overcome his dark smoke and grit problem? Some advice on this has been issued by Mr. Henry Brooke, the Minister of Housing and Local Government, in a memorandum to local authorities on the industrial provisions of the Clean Air Act.

Dealing with dark smoke, Mr. Brooke says it is to be expected that the number of hand-fired boilers will decline in view of the difficulty of controlling smoke from their furnaces. Frequently, he states, the installation of mechanical stokers or conversion to oil firing will help in reducing smoke, though occasionally gas or electric firing may be the better solution.

"Firms should be encouraged in appropriate cases to review the whole of their existing methods of steam raising and steam utilisation, instead of looking solely at the question of avoiding smoke," he says.

"It may be more economical in the long run to put in a different boiler, rather than to deal simply with the existing firing arrangements."

Mr. Brooke also drops the hint that fuel saving equipment can, in many cases, qualify for an investment allowance for income tax purposes. The type of equipment covered includes mechanical-firing plant for solid fuel fired equipment, oil-firing equipment, waste-heat recovery equipment, feed water treatment plant and certain control equipment and instruments.

An approach may also be made to the Ministry of Power for an interest-free loan from the Government Loan Scheme. Such loans are available for any approved fuel-saving scheme, provided it can be shown that there would be a worthwhile saving which could not otherwise be achieved.

The jam boiling room, showing the semi-circular batteries of pans.

Jam-Making the Modern Way

Kellie's Install Automatic Equipment in German Factory

When the German firm of Schwartauer Werke A.G. decided to modernise their jam factory at Bad Schwartau, they invited the Scottish firm of Robert Kellie and Son to submit plans for the installation of automatic equipment. The result has been one of the most modern installations in the world, of which we give an illustrated description.

MODERN production techniques call for the minimum possible manual handling of raw materials, intermediate products, and finished goods, and the maximum possible amount of automatic control. When they were invited to submit plans for the modernisation of the jam factory of Schwartauer Werke A.G. at Bad Schwartau, West Germany, Robert Kellie and Son, Ltd., kept these two guiding principles firmly in mind. They designed an installation which provided for the mechanical handling of all materials wherever possible, and for a large measure of automatic control of production techniques. They were able to bring to this task many years of experience in the installation of large food manufacturing plants, and the co-operation between the two firms has resulted in one of the most modern jam factories in the world.

General layout

The plant has been designed for an output of finished jams, jellies and marmalades of approximately 90 tons per 9 hr. day. The desirable principle of gravity flow of the sugar syrup, glucose and fruit juices has to a large extent controlled the layout adopted, and where gravity cannot be used mechanical pumping of delicate products has been eliminated in favour of non-turbulent movement by means of compressed air.

A number of other important advantages have been incorporated in the layout. These include the elimination of all manual trucking of the finished jams, etc., between the rapid-boiling pans and the weighing receivers for determination of soluble solids. The boiling pans are assembled in four batteries, each of six pans, and each pan is provided with an independantly controlled gravity-flow glass delivery pipe which connects it to the jam weighing receiver.

Four sets of automatic pan-charging units have been situated in convenient positions relative to these four batteries of pans. Each charging unit is fed by gravity flow from overhead tanks, and the

Left: **A view of the stainless steel sugar syrup and pulp storage tanks, the latter on the left. The upper of the two pipes shown is the pulp line.** *Right:* **The pulp tanks are freely movable on overhead conveyors, as shown in this illustration. The tanks feed directly by gravity to the automatic pan charging units, shown below right.**

weighed charge is forced by compressed air through distributing pipes to the particular pan in the battery requiring to be charged. By this system, trucking, lifting and hand-charging of sugar and pulp into the pans is eliminated. Accurate weighing of the charge is ensured, as the control of each batch remains entirely in the hands of one operative, and the processing time is considerably reduced.

After check-weighing for soluble solids, the jam gravitates to cooling trays, and thence to the holding tanks from which the filling machines draw their supplies. Two of the batteries of boiling pans are designed to supply a filling line for 1 lb. containers, and two to operate with a bulk filling line handling 5 kilo and 12½ kilo containers. After filling, the jam packed in 1 lb. containers is sterilised, vacuumised and cooled, and then passed on a conveyor line to the labelling cartoning and despatch department.

The whole operation, comprising automatic charging of the boiling pans; boiling the jam to the desired temperature; gravitating the boiling jam into the soluble solids weighing receivers; cooling prior to capping; sterilisation, vacuumisation and final cooling; and transfer of the filled containers to the labelling department; is designed to occupy a cycle of only 1 to 1½ hr. duration.

It will now be appropriate to examine the individual operations in more detail.

Sugar syrup plant

For an output of 90 tons of finished jam per day an equivalent weight of filtered sugar syrup and glucose is required. Preparation of this syrup commences on the ground floor, where two stainless-steel sugar melters, each with its own calibrated pre-heating tank, and other ancillary equipment, are situated. Raw sugar is conveyed to these units by a worm screw transporter from the bulk sugar storage tank. The sugar is weighed from the exit of the bulk storage hoppers, so that it can be trickle-fed to the melters, and a rapid dissolving rate is thus ensured. Glucose is added to the melters while the sugar is being dissolved; this is fed by pipeline from storage tanks, and is added in the form of 8-9% or 23% solution. The sugar syrup is prepared to a strength of 75-80° Brix, total syrup output from the melters being 50 tons per day, exclusive of glucose.

From the melters the sugar flows by gravity to a stainless-steel "blow up" tank contained in the basement. From this it is blown by compressed air through a 2 in. stainless-steel pipeline to the third floor, where 8 stainless-steel holding tanks are situated. Each tank is fitted with a stainless-steel coil by which a given temperature can be maintained, and is served by a 3-way valve in the overhead pipeline. The tanks have each a capacity of 1,270 Kg., and two of them are able to hold a complete charge from the blow-up tank. The tanks are arranged in four lots of two, each pair serving one of the automatic pan charging units on the floor below, into which they discharge by gravity flow.

Fruit pulp

Various pulps are used in the manufacture of jam, and these are treated somewhat differently according to their nature. Those containing discrete portions of fruit which it is desired to preserve, such as strawberry and cherry, are transported from bulk storage by an overhead conveyor system. This carries them to eight 20 cwt. pulp storage tanks situated adjacent to the sugar syrup tanks on the third floor, and like them arranged in pairs, each pair serving one of the pan charging units.

Other pulps are pumped to these holding tanks from bulk storage.

Jam boiling department

The heart of the whole process is, of course, the jam boiling room. As was indicated earlier, the twenty-four rapid boiling pans are assembled in four batteries, each of six pans. The pans of

A battery of water calibrating and sugar tanks, which form part of the production line.

each battery are arrayed in a semi-circle, and are served by an automatic pan charging unit which can charge any pan in the unit to which it is attached.

The charging units are themselves served by the sugar syrup and fruit pulp tanks already described, the raw material flowing by gravity from the tanks to the appropriate weight tank in the unit.

When the desired amounts of the various ingredients constituting a charge have been weighed, the charge is forced by compressed air to the boiling pan in which it is required. Connecting pipes in this system are all of stainless steel throughout.

When the boiling is complete, the boiling jam passes through gravity-flow, glass delivery pipes to the soluble solids weighing units. These are four in number, one to each battery of pans, and once again each pan in a battery is connected individually to the weighing unit serving that battery. After check weighing for soluble solids, the jam passes to the cooling and filling room on the floor below, as is described later.

With the automatic charging unit, the output of finished jam from each rapid boiling pan may be reckoned at eight boils per hr., each of 147 lb. The total output is therefore in the region of 10 cwt., per pan per hr., depending on the type of jam being produced, and the local conditions. The pans can be charged and discharged in 2 min., and the average boiling time with a steam pressure of 80 lb. p.s.i. is 5½ min. This represents an evaporation rate of 9·3 lb. per min., with a steam consumption of 93 lb. for each boil.

The temperature of the boil is periodically determined by the factory chemist, and varies with such factors as barometric pressure, acidity of fruit, pectin set, class of pulp, etc.

Filling department

After leaving the soluble solids weighing units, the jam runs on to one of four copper cooling tables, where it is allowed to cool to 180°F. Jam from two of these tables is filled into 1 lb. jars, and that from the other two into bulk containers. The 1 lb. packs are filled by two high-speed straight-line jam filling machines, each capable of filling one hundred and twenty 1 lb. jars per min. Each filling machine is synchronised with an automatic capping machine and stainless-steel conveyor, which automatically transfers the hot-capped jars to a "Hydroseal" unit, where they are continuously sterilised, vacuumised and cooled in a period of 30 min. approx. After cooling, the jars are automatically discharged in a single line to the labelling, cartoning and despatch department.

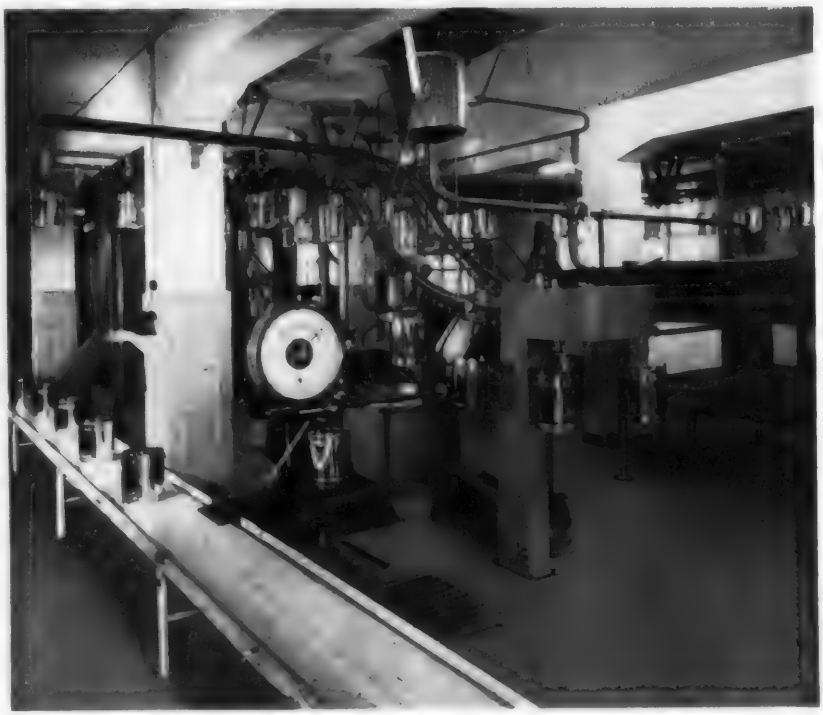
Jars are sterilised and rinsed before use in two Kellie type 50JJ continuous operation machines.

For filling into bulk containers, the jam is allowed to flow by gravity from the cooling tables to one of two filling lines. The first unit in each line is a stainless-steel receiver, where the jam is continuously mixed and cooled to the required filling temperature.

An automatic pan charging unit in the Kellie compressed air system. The charging unit has a pre-determined electronic-controlled weighing unit. The photograph also shows the pulp tanks in the roof.

Jar washing and sterilising is an important function in the production line, and two 50JJ jar washing and sterilising machines (*left*) perform this function in the German factory.

Below: **The jam receiver and the mixing tank are shown adjacent to the weighing unit and the bulk filling station. The overhead conveyor delivers empty cans to the filling point.**



When this has been reached, the jam is pumped through a Pyrex glass pipeline by means of acid-resisting bronze concentric rotary pumps to the filling point. The containers into which the jam is filled are placed by hand on the central floating section of a roller conveyor. This is attached to the platform of a sensitive dial weighing machine, which is tared to suit the combined weight of the conveyor section plus the empty container.

Empty containers are fed to the filling point by an overhead mono-rail conveyor, and the filled cans are discharged by a belt conveyor to a stacking position, where they remain until cool enough for closing and sealing.

For this operation only 2 girls are necessary, a considerable saving on the labour force previously employed.

Auxiliary operations

Vapour extraction.—Four complete sets of draughting units have been provided, one for each battery of six pans. Each unit comprises six polished stainless-steel canopies or hoods, fitted with hinged inspection doors, internal condensate collectors, and connections for thermometer and water inlet. The hoods over the pans are connected to 9 in. stainless-steel ducts, which in each battery radiate to a central main junction or manifold. To this is connected a motor-driven axial-flow fan with a capacity of approximately 6,000 cu. ft. per min. at $\frac{3}{4}$ in. water gauge. Above the fans for each battery, a 24 in. stainless-steel chimney carries the vapour upwards and discharges it to the atmosphere at or about 2 ft. above the factory roof.

Compressed air installation.—The compressed air installation consists of a vertical duplex air compressor with a piston displacement of 100 cu. ft. of free air per min. It is fitted with an automatic device which regulates the supply of air at 50 lb. p.s.i. according to demand, thus effecting considerable economies in the use of power.

The products of Schwartauer Werke A.G. are well-known in Germany and their high quality and purity owes a great deal to British enterprise and planning in the provision of a jam line which fulfils all the functions of true automation. The factory has been visited by many jam manufacturers on the Continent, who have expressed admiration for the whole layout and production line.

HYGIENIC PREPARATION OF MEAT PRODUCTS

A. I. Ross,* M.D., D.P.H.

The continued rise in the incidence of food poisoning is giving concern to health authorities throughout the country. Meat products are often implicated in these outbreaks as the source of infection, and in this article Dr. Ross discusses ways in which all danger can be removed of outbreaks from this source.

MEAT products are important in human welfare because they provide a very good source of high quality protein and because, in spite of recent advances in hygiene, they are still the vehicle of infection in many cases of food poisoning, meat being an excellent culture medium for bacteria. For example, in England and Wales in 1956,[1] of 268 outbreaks and family outbreaks of food poisoning for which information was available, processed and made-up meat was the vehicle in 181 (67%). Table 1 gives details. The part played by such products is more clearly seen when it is pointed out that the second most common vehicle of infection was canned meat (not included in the definition "processed and made-up meat"), which was responsible for only 19 outbreaks, and the third, sweetmeats, for only 15.

Fortunately, good bacteriological standards are compatible with, and indeed assist in, producing a good quality product, which keeps well, looks attractive, and appeals to the public.

Sources of infection in meat

The ways in which meat may become contaminated by food poisoning organisms are numerous and some almost inevitable.

Salmonella. Pigs are frequently infected, various investigations showing from under 1% to as high as 10% in one series in America.[2] In certain circumstances infection may become much more prevalent. Thus Galton *et al.*[3] found 78% of pigs held in large pens for 12-48 hr. positive for salmonellæ.

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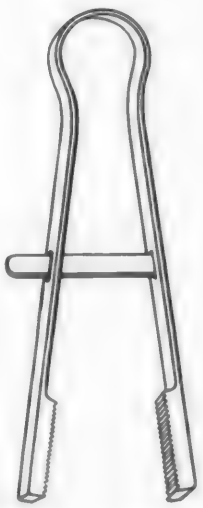


Robust forceps, 12 in. long, recommended by the author for the handling of cooked meats.

The floors of the pens were always positive and 91% of sides of carcases after dehairing were positive.

Cattle may also be infected. Ritchie and Clayton[4] found *Salm. dublin* in 10% of fæces samples and in the livers of 12% of apparently healthy Irish cattle in the Birkenhead abattoir. Sheep show salmonellæ much less often.

Rats and mice, which may have access to abattoirs and places where meat is stored have been shown frequently to be infected with salmonellæ, *e.g.*, Savage and White[5]—20 of 66 rats examined had been or were infected when examined. In a butchery by-products factory 40% of rats were carriers of salmonellæ.[6]

Human beings sometimes develop diarrhœa due to salmonellæ and may become carriers, passing the organism in their stools perhaps for months without being aware that they are doing so. For example, in Leicester in 1956, of the 68 patients infected with salmonellæ 23 took 8 weeks or more to clear and 3 of these took 13 weeks, the longest being 18 weeks. None had diarrhœa after the first few days.

Duck eggs and, less often, hen eggs may also be a source of infection. Foreign dried egg albumin and frozen bulked eggs have caused trouble in recent years. A recent report of the Public Health Laboratory Service[7] deals with this subject and gives results of an investigation in this country.

Staphylococcus. Perhaps one-third of humans harbour in their noses, without symptoms, the variety of staphylococcus (*Staph. aureus*) which causes food poisoning, and about a quarter have them on their hands. This organism also causes septic skin lesions, such as pustules and boils. Ludlam[8] recovered *Staph. aureus* from 63·5% of carcases hung in a municipal abattoir. This organism also causes cattle mastitis.

Clostridium welchii can be recovered from the fæces of healthy animals and humans and is found in soil and dust.

Clostridium botulinum lives in soil, from which it gets on to animal foodstuffs and vegetables. Some animals, particularly pigs, may be intestinal carriers.

Viruses. Infections by foodborne viruses are also possible, particularly poliomyelitis, which is excreted in the fæces of those who have had clinical attacks of poliomyelitis, and also sometimes in the fæces of those who have not been obviously ill.

Causal agents of food poisoning in processed meats

The presumed causal agents in certain outbreaks associated with processed or made-up meats are shown in Table 2.

The animal may be infected before slaughter, the carcase when hanging, during transport, while being prepared, after cooking, and so on. From the point of view of the manufacture of meat products it should be realised that although the meat has been infected and passed as sound it may still be contaminated as early as the abattoir, and the possibilities of contamination increase with each stage until it is cooked. Good technique in the abattoir is important in preventing salmonella, *Cl. welchii* and *Cl. botulinum* infection.

Table 1. Food Poisoning of all types, 1956, England and Wales. Outbreaks (including family outbreaks) associated with Processed and Made-up Meats

Type of meat	Number of outbreaks
Re-heated meat	48
Meat pies	45
Cold meat, ham	25
Pressed meat	15
Brawn, meat in gelatine, etc.	16
Sausages	8
Other meat products, once-cooked stew, sandwiches, etc.	24
	181

Table 2. England and Wales, 1956. Outbreaks (including family outbreaks) associated with certain Processed or Made-up Meats

	Salmonellæ	*Staphylococci*	*Cl. welchii*	*Other agents*	*Not discovered*	*All agents*
Sausages	2	2	—	—	4	8
Meat pies	7	5	12	2	19	45
Pressed meat	2	9	1	—	3	15
Brawn, meat in gelatine, meat roll, potted meat	4	6	2	—	4	16

Examples of food poisoning outbreaks due to different organisms

Staphylococcus. In Leicester in July, 1951, ten persons who had eaten cold pork 2-7 hr. earlier suffered from diarrhœa and vomiting lasting from half an hour to five hours. There were several defects in the preparation of the food responsible. After cooking by boiling, the meat was transferred in metal scoops to an unsterile stainless-steel table top, where it drained and was allowed to cool sufficiently to be handled. It was trimmed by hand, and placed in moulds, the bones, sinews, etc., being removed. Boiling gelatine was added and the full moulds were covered by metal plates. There were many possibilities for contamination of the utensils. One hour later the moulds were placed in a refrigerator at 38°F. Three days later the meat was sent to a retail shop and sliced on a slicing machine which was not being properly dismantled for cleaning and was never sterilised. *Staph. aureus* (coagulase positive) 'phage type 6/7/47/54+ was recovered from the pork and from the stools of four of the patients in the outbreak.

Salmonella. In June and July, 1951, in Lancashire, 1,149 persons, five of whom died, were infected with *Salm. bovis morbificans* in meat pies, the source of infection being the meat used in the preparation of the pies. In their report, Miller *et al.*[9] state:

"Assuming that the infecting organism was present in the meat before it was filled into the pies and baked, there is very good reason to believe that it could have survived in many of the batches of pies. . . . The addition of warm gelatine after baking and the fairly high atmospheric temperatures prevailing at the time would encourage the rapid multiplication of surviving organisms and thus produce the highly infected product which caused the outbreak."

Cl. welchii. In Leicester on March 11, 1957, 17 people suffered from diarrhœa and some vomited 3-16 hr. after eating a canteen meal which included steak. The meat had been bought on Friday, March 8, and stewed, being allowed to cool in the kitchen in large vessels, which were later kept in a refrigerator over the week-end. Pies were prepared on Monday, 11th, and eaten by 109 people between 12 noon and 1 p.m. Some of the meat was kept warm—not boiling—for 15 people who had their meal at 3 p.m. All 15 had symptoms. Two of those who had the earlier meal were also effected.

Cl. botulinum. An example is a recently fatal outbreak of botulism among Labrador Eskimos (Brocklehurst[10]). A favourite Eskimo diet called *Utjak* was the vehicle. "This is prepared by placing seal flippers, complete with fur, in a closed container, and leaving it behind the stove for a variable period of several hours to several days." In this case the meat was cooked for 10 days at temperatures probably between 20°C. and 40°C. in an empty gasoline can, which had previously been used for treating seal skins by heating them beside the stove until the hairs came out. Five of six men who ate the *Utjak* died of botulism.

Two types of meat products from food poisoning point of view

Prepared meat products may conveniently be divided into those that are cooked by the purchaser before eating, such as sausages, and those, such as pies and pressed meats, that are eaten without further cooking. As shown in Table 1, the second group is much the more dangerous from the point of view of food poisoning. Apart from Clostridia, any organism present in those products which are cooked by the purchasers before eating, stand a good chance of being killed or having their toxins destroyed before consumption. As a preventive the importance of thorough cooking and

quick cooling must be stressed. Most strains of salmonellæ and staphylococci are killed at 62°C. for 2 min. Clostridia are much more resistant and many withstand boiling.

Preparation of meat products

This subject has been thoroughly dealt with at official and governmental levels in recent years. There has been the Report of the Manufactured Meat Products Working Party (1950), the booklet "Hygiene in Meat Products Factories" (1952) published by the Food Manufacturers' Federation Inc., and there are the Food Hygiene Regulations, 1955. The Minister is advised on the subject by the Food Hygiene Advisory Council.

Appreciation of the problems involved may be obtained by considering surgical operating theatre techniques. As Dolman[11] points out, it may be impossible to follow the requirements in the meat trade but some nearer approach to it than is now customary is quite feasible.

The theatre itself has smooth, impervious, easily washable floor and walls without dust collecting ledges, the junctions and corners being rounded for easy cleaning. Windows are double glazed to prevent condensation and loss of heat. In the larger theatres air conditioning is used, warm filtered air being introduced continuously at high level with outlets just above the floor, any flow of air in the operating suite being away from the theatre and sterilising room.[12] Those entering the theatre wear outer clothing—cap, mask and gown—which has been sterilised by steam. All instruments are sterilised and those who are operating or handling instruments have "scrubbed up"—*i.e.*, sterilised their hands as far as practicable by thorough washing and scrubbing—and they wear sterile rubber gloves. In certain cases—*e.g.*, operations on joints—a "no touch" technique is used, the surgeon using instruments to handle the tissues and not touching them with his hands.

These methods are mentioned to show what must be done to avoid the introduction of organisms. To follow them strictly in a busy factory must be considered a counsel of perfection, but there is much to be learned from them. Certain aspects are discussed below.

Stainless steel tables with recessed detachable wooden boards for cutting meat.

(1) *The building* dealt with in Part IV of the Food Hygiene Regulations, 1955. As well as the usual points, important is the avoidance of excessive condensation causing dripping from the ceiling and cross-girders. Condensation can be decreased by having high ceilings and good ventilation, and by avoiding low girders.

(2) *Personnel* must not continue to work when knowingly suffering from diseases which may cause trouble in the meat product—Regulation 11 of the Food Hygiene Regulations. A notice should be displayed giving instructions to food handlers. The following is a copy of the one used by the City of Leicester Health Department and Clean Food Guild.

"CITY OF LEICESTER
Health Department and Clean Food Guild
Food Hygiene Regulations, 1955
Instructions to Food Handlers

In the course of your work you must:

(*a*) Do everything possible to protect the food you are handling from contamination;

(*b*) Keep your overall or clothing clean;

(*c*) Wash your hands whenever they are dirty, especially after using the toilet;

(*d*) Keep any cut or sore covered with a waterproof dressing;

(*e*) Refrain from spitting, smoking or taking snuff when handling food or when in a food room;

(*f*) Notify your employer if you have any symptoms likely to cause food poisoning—*e.g.*, sore throat, sickness or diarrhœa, boils.

Note: It is a punishable offence to disregard these instructions."

Health Departments will be very willing to advise on whether or not an individual should be employed on food handling. Rather than stopping work completely it may be possible for him to work away from food for a time.

Staphylococcal infection may prove a difficulty. Although many of the staff may carry staphylococci in their noses and on their hands, it is neither desirable nor practicable to test food handlers for staphylococci as a routine, nor indeed are surgeons or other operating theatre staff tested. Prevention must depend on technique. Should a nasal carrier be found—for example, when an outbreak of food poisoning is investigated—he may present a problem, as the carrier status may prevail for a con-

siderable time. Although it is recommended from time to time that periodic bacteriological examination be made of food handlers' fæces to detect salmonella carriers —*e.g.*, Dolman[11]—opinion in this country is against such measures, and is summed up in the Report of the Manufactured Meat Products Working Party, para. 167: "Compulsory medical examination of individuals as a condition of employment in the meat products trades would be of limited value and the results would not be commensurate with the cost and the dislocation to the trade that would be likely to result."

Personnel must wear clean overalls and caps, and when boning cooked meat and placing it in presses, masks should be worn (Ross[13]) (see photograph). It is interesting that in Russia Mitchison[14] noticed in the bigger railway stations that the assistants selling food wore white overalls and small white surgical masks on their faces.

All food handlers must thoroughly wash and scrub their hands before starting work and after visiting the toilet. Preferably each person should have an individual towel rather than use, for example, roller towels. Storage of towels near the wash-hand basins may be difficult and paper towels or electric hot air driers may be necessary.

The reasons for hand washing have been clearly shown by Hutchinson,[15] who found that toilet paper in double thickness was permeable to *Shigella sonnei* —the usual organism of dysentery in this country, related in its habits to salmonellæ. She also demonstrated that during the second week of an outbreak of dysentery among the children in a day nursery, swabs from 17 of 35 pairs of hands were positive for *Sh. sonnei*. Organisms were found to remain alive on the skin of the fingers for 3 hr.

Personnel should be given education in hygiene as part of their training. Films and film strips are available and Health Department staff are usually very willing to help.

The preparation of pressed meat products, showing protective clothing (note head covering and mask) and instruments in small bucket containing hypochlorite solution. Cooked meat, untouched by hand, does not come into contact with any unsterile surface.

Instruments and tables

All instruments and parts of machines that are coming into contact with meat, particularly cooked meat, must, wherever possible, after thorough cleaning, be sterilised by boiling or steaming for at least 5 min. or by washing with weak hypochlorite if boiling is impossible.

Tables on which meat is placed are best made of stainless steel, and it is useful to have removable wooden chopping boards recessed in the tables as shown in the photograph, the boards being taken out when the table is being cleaned (see illustration).

To consider certain products in detail:

(1) Sausages

Some of the main points to be watched are scrupulous hand washing by employees and the cleaning and sterilising of machines. It must be accepted that such things as fillers, spices and salt are not sterile, but they are unlikely to contain pathogenic organisms.

(2) Pies

Great care is necessary in their manufacture, which has been dealt with from the hygienic point of view by Miller *et al.*[9] There are two special dangers—(1) inadequate cooking of the meat contained in the pies and (2) unsterile gelatine. If the meat is not cooked sufficiently to kill salmonellæ or staphylococci, then during cooling it may act as a most efficient culture medium and produce a heavy growth of these organisms or enough staphylococcal toxin to cause illness in those who eat the pies. The larger the pie the greater the difficulty in cooking the meat in the centre. After cooking experiments, Miller *et al.*[9] say that an adequate temperature and time formula for the baking of pies should be worked out for each bakery, and once found strictly followed. Their findings suggested that 380°F. for 40 min. for 4 oz. pies and 380°F. for 35 min. for 2 oz. pies were satisfactory, producing an acceptable product without salmonellæ. [Brightwell, quoted by Hobbs,[16] recorded 177°C.-204°C. (350°F.-399°F.) for 2½-3 hr. for a 6½lb. meat pie.] After cooking, the pies should be covered and cooled fairly rapidly. The gelatine must be boiled for at least 5 min. and kept in a covered container at not less than 170°F., being added to the pies through a pipe. After use the container and pipes should be thoroughly cleaned, boiled for at least 10 min.

Butcher using instruments to cut meat, which is on a sterile tray. Note the lid of the mould, which is hung by the handle on a metal rod.

and stored in a clean place. They should again be sterilised before use.

Further details and discussion of essential precautions in the preparation of pies are given in Miller's report, which should be considered essential reading for all those in charge of pie production.

(3) Pressed meat products

These articles are particularly dangerous as many of them, such as tongues and meat containing bones, may have to be skinned or trimmed and the bones removed by hand after cooking. Their production was investigated in Leicester some years ago, and many hazards and dangers were found. These include the following. The instruments used for transferring the meat from the boiler to the table top or other surface on which the meat is trimmed, the cutlery used for trimming the meat, and the moulds and their lids, may not be sterilised before use. The meat has to cool almost to blood heat—the best temperature for pathogenic bacterial growth—before it can be handled, the gelatine solution may be inadequately sterilised, kept uncovered and allowed to cool before being added to the press, and the finished product may be cooled too slowly and stored at an insufficiently low temperature. In a series of bacteriological specimens taken from meat and gelatine from 20 different meat preparing premises, *Staph. aureus* (coagulase positive) was obtained from 2 different premises, *Staph. viridans*—2, *Strep. fæcalis*—4, Proteus—1, *Esch. coli*—2, coliforms—2, Staphylococci (coagulase negative)—2, *N. catarrhalis*—1, Micrococci—5, and *B. subtilis*—3. Heat resistant *Cl. welchii* were not isolated from any specimens. In only two cases were all specimens sterile.

In preparing these products very high standards are essential. Moore and Topley[17] recommended that for brawn:

"(1) Handling of the brawn should be avoided, in particular mixing of the chopped pigs' heads with the savoury gelatine mixture should be carried out with suitable instruments.

(2) All utensils should be sterilised as far as possible, preferably by boiling.

(3) The final mixture should be boiled for half an hour, filled into sterilised tins and then cooled as rapidly as possible and kept in a refrigerator until offered for sale."

A no-touch technique is recommended by the Chief Medical Officer of the Ministry of Health in his 1954 Report.[18]

A method is described in detail by Ross.[19]

"The meat is cooked completely or partially, depending on what is to be done later. All moulds, lids, knives, forks, etc., and a small bucket or jug, are boiled or steamed for at least 10 min. The butcher wears clean protective clothing, including a washable head-covering and a gauze mask covering the nose and mouth. After 10 min. the bucket or jug is withdrawn from the boiling water—housewives' wooden laundry tongs costing about 3s. 6d. have proved useful for this purpose the gripping end having first been sterilised by boiling—and filled with boiling water to which a measured amount of hypochlorite, to give 100 p.p.m. of chlorine, is added. The other knives, forks, etc., are then placed in the bucket with the handles projecting. A mould is removed using the tongs, inverted, shaken and placed on a table. The meat is then filled directly into the moulds and if it is necessary to trim the meat, remove bones, etc., this is done on a tray previously boiled. After each instrument is used it is returned to the hypochlorite solution.

Boiling gelatine solution is poured into the moulds and a sterile cover applied, using the wooden tongs to handle the cover when it is made of sheet metal without a handle, otherwise holding the cover by the handle, care being taken that the part that is to come into contact with the meat or jelly does not touch anything unsterile before application. In the case of small producers who have not facilities for further steam cooking, the filled mould is then taken straight to the cold room or refrigerator, if this is large enough not to suffer a significant rise of temperature when a hot article is placed inside. If the refrigerator is small the meat is cooled by placing the press in a sink filled with cold water for 10 to 20 min., the water running constantly and overflowing. Large producers should use cool tunnels or cold rooms with fans to circulate the air.

When the meat is of poor quality, or contains bones, as in the case of tongues which have to be skinned and boned, the meat can be partly cooked, trimmed, recooked to sterilise, and then placed in the presses, using the aseptic method described."

Some producers have found useful forceps designed in co-operation with Alfred Cox (Surgical), Ltd., Edward Road, Coulsdon, Surrey—see illustration.

If this technique has been properly used the product will not contain organisms that will produce food poisoning and will not go sour or spoil if properly stored before sale. Bigger producers should use the aseptic technique given above, but after the presses have been filled the advice given in para. 148 of the Report of the Manufactured Meat Products Working Party should be followed:

"The final cooking should take place after the tongue or other meat has been placed in the mould in which it is to be pressed; manufacturers with facilities for cooking by steam will have no difficulty in doing this, and others using open-cookers should, whenever possible, modify their practice to secure the same result."

The important part of the preparation is summed up as follows in the City of Leicester Clean Food Guild Code of Practice for Manufactured Food Products:

"Tongues and pressed meat which are handled after cooking shall either be boiled for a further period of not less than five minutes and then with the least possible delay be placed in the presses using sterile instruments without touching by hand; or, alternatively, after handling shall be placed directly into the presses with the least possible delay and then be brought up to a suitable temperature for a time commensurate with the size of pack.

Alternatively, tongues and pressed meat which are not handled after cooking need not be recooked or steamed—*i.e.*, when sterile instruments have been used in an approved technique."

The length of cooking depends on the size of the mould and to some extent on the tightness with which the meat is packed and the proportion of liquid. In a series of tests in Leicester, using moulds containing 18 lb. of meat and liquid and placing in the centre of the pack ampoules containing *Esch. coli*, which are approximately as difficult to kill as salmonellæ, we found that steaming for 1 hr. at atmospheric pressure was adequate. The bacteriological work was kindly undertaken by Dr. N. S. Mair, Director of the Leicester Public Health Laboratory. Cooking for shorter times at increased pressures did not give consistent results.

Aseptic methods should be used when the moulds are emptied, and the cooked meat should be sold in a part of the shop distinct from where raw meat is sold, using separate knives and forks for each.

To sum up: meat products if carelessly prepared are dangerous, but if cooked and stored with care are a safe form of diet. The care and skill of employees in this trade and the use of a good technique are most important. The food handler should understand the reason for the methods, and employers will always find Health Departments very willing to arrange talks and demonstrations for their staff.

REFERENCES

1. Report, Chief Med. Offr., Min. Hlth., Lond., 1956.
2. H. L. Rubin, M. Scherago and R. H. Weaver. *Amer. J. Hygiene*, 1942, **36**, 43.
3. M. M. Galton, W. V. Smith, H. B. McElrath and A. B. Hardy. *J. Infect. Dis.*, 1954, **95**, 236.
4. J. M. Ritchie and N. M. Clayton. *Mon. Bull. Min. Hlth., P.H.L.S.*, 1951, **10**, 272.
5. W. G. Savage and P. B. White. *J. Hygiene, Camb.*, 1923, **21**, 258.
6. G. B. Ludlam. *Mon. Bull. Min. Hlth., P.H.L.S.*, 1954, **13**, 191.
7. Report, Pub. Hlth. Lab. Service, *Mon. Bull. Min. Hlth., P.H.L.S.*, 1958, **17**, 36.
8. G. B. Ludlam. *Mon. Bull. Min. Hlth., P.H.L.S.*, 1952, **11**, 138.
9. A. A. Miller, C. G. M. Nicol and F. Ramsden. *Reports on Pub. Hlth. and Medical Subjects. Min. of Hlth.*, No. 96, 1955.
10. J. C. Brocklehurst. *Brit. Med. J.*, 1957 (II), 924.
11. C. E. Dolman. "The Epidemology of Meat Borne Diseases—Meat Hygiene." W.H.O. Monograph Series, No. 33, 1957, 11.
12. Hospital Building Bull. No. 1, Min. Hlth.—Operating Theatre Suites. 1957. H.M.S.O.
13. A. I. Ross. *Med. Offr.*, 1955, **93**, 104.
14. L. Mitchison. *Manchester Guardian*, December 28, 1957.
15. R. Irene Hutchinson. *Mon. Bull. Min. Hlth., P.H.L.S.*, 1956, **15**, 110.
16. Betty C. Hobbs. *Food Hygiene Absts.*, 1954, **26**, 601.
17. B. Moore and E. Topley. *Mon. Bull. Min. Hlth., P.H.L.S.*, 1943, **2**, 71.
18. Report, Chief Med. Offr., Min. Hlth., Lond., 1954.
19. A. I. Ross. *Pub. Hlth.*, 1953, **66**, 193.

Sanitation and Meat Products

PERHAPS in no other branch of the food industry is sanitation quite so vitally important as in the preparation of meat products. Meat is an almost ideal medium for bacterial growth, and unless meat processors are aware of certain fundamental principles, there are many pitfalls which they may encounter. A brief but succinct report has recently been given of the problems confronting the meat processor,* and this booklet is worthy of consideration by anyone in the industry.

* *Sanitation Problems in the Meat Industry.* By C. F. Niven, Jr. American Meat Institute Foundation, Circular No. 39, November, 1957.

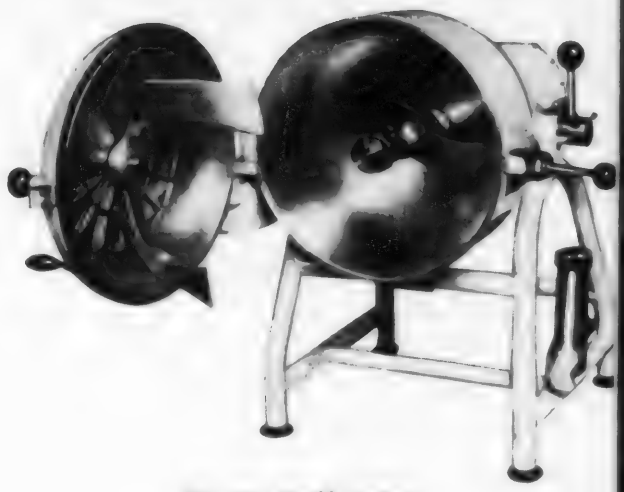
Improving Meat Quality

MEAT, unlike many other agricultural products, has little or no other outlet than as a food. If consumption is to be increased, therefore, this increase can be brought about only by decreasing the cost of the commodity or by increasing its appeal to the consuming public. The appeal depends largely upon the quality of the product, and a brief resumé of modern thinking on the question of meat quality has been published.* This booklet gives useful tables illustrating the high nutritive value of various cuts of meat, and outlines some of the research work now being done on the subject of meat quality.

* *Improved Quality the Key to Increased Utilisation of Meat.* By D. M. Doty and B. S. Schweigert. American Meat Institute Foundation, Circular No. 40, December, 1957.

SUCCESS WITH MEAT PRODUCTS

A "FOOD MANUFACTURE" survey of the materials and equipment which are available to assist manufacturers in this highly competitive market



The New Rapid Cutter, a cutter and grinder made by Stokes and Dalton Ltd.

Machinery

THE day is now past when the bulk of sausages consumed in Britain were bought direct from small butcher's shops. Today sausages are distributed on a nation-wide basis, and must retain their wholesomeness and fresh appearance over relatively long periods. This has called for a considerable modification in production techniques, and machinery has been designed which will not only cope with large output rates but will also minimise discoloration and other undesirable effects.

Foodtech, Ltd., have been in the forefront of this drive to develop new and more efficient sausage machinery. Their *EMS-Rotor* chopper has been designed to ensure that the meat is cut cleanly, with the minimum squeezing of juices from the tissue—a potent cause of discoloration. It is equipped with a large dome to prevent squeezing and heating of the mix, and the chopping blades can be operated at two speeds to give a fine or coarse cut in a given time, the chopping time being preset on the machine. Fresh or frozen meat can be used without pre-treatment, and the chopper is said to break down blocks of frozen meat measuring 12 by 24 in. in 25 sec.

The KS grinder, a development of the Foodtech Super Grinder, is recommended by the makers for the comminution of meat trimmings and rinds and for the production of skinless sausages and other meat products.

It is made in several capacities ranging from 30 to 250 lb., and where required an automatic ejector can be fitted.

The chopper links up well with the *Rohwer* linker, marketed by the same firm. This can be operated as a straight filler or, using the special *A1* attachment, as a linker which will automatically deliver anything from 2 to 40 sausages per lb. at a speed of up to 185 links per min. Natural or artificial casings can be used, and the individual sausages are claimed to be alike in weight to within a very small tolerance. The machine therefore eliminates much tedious hand weighing, as well as ensuring a very uniform product. The linking attachment can be fitted to existing power fillers.

Other machines developed for the meat trade by Foodtech, Ltd., include the *KS* grinder, which will reduce all types of meat, gristle, trimmings, etc., to a homogeneous emulsion, and is recommended for the production of skinless sausages, frankfurters, and liver and luncheon sausages, as well as for the manufacture of meat and fish pastes, fruit purées, and mayonnaise.

Another firm deservedly well known for its sausage-making and other equipment are J. C. Wetter

and Co., Ltd., whose new *Kool-Kut* bowl chopper was described and illustrated in our April issue (p. 168). This has a chopping capacity of up to 250 lb., and may be equipped with from 3 to 12 stainless steel knives. Chopping time is from 2 to 3 min., and temperature rise during chopping is said to be negligible even without the use of iced water. A disc unloader and process timer are fitted.

The *Wetter* filler and linker will measure off sausages in half pounds or pounds at the rate of 40 lb. per min., or will link and twist automatically at the rate of 120 links per min., as well as serving as a straight filler. A problem with high-speed machines of this type is often the supplying of sufficient spools of empty casing to keep up with the operation, and this process can be greatly facilitated by use of the *Rapid* skin spooling machine, made by the same firm. This machine is fitted with a double clutch mechanism which enables two operators to work independently, and an output of approximately 700 ft. per min. can be achieved. Dummy tubes are of polished stainless steel, and 12 are supplied with each machine.

A range of mincers is also supplied by J. C. Wetter. Type *M*.12 is a large machine with a 12 in. mincer plate which may be fed by a conveyor and has a capacity of up to 8 tons per hr. on coarse cut. It is chain-driven from a 45 h.p. motor, and can be supplied with wide- or narrow-pitch feedworms and a variety of knife and plate arrangements.

The *M*6 is a smaller mincer with a 6 in. plate and a capacity of 20 cwt. per hr. on coarse cut. It is an extremely compact machine, designed for the easy attainment of hygienic conditions. The knives and plates operate on a shear cut principle. The machine is supplied with a large hopper or feed tray made of polished corrosion-resisting aluminium alloy.

Other machines available from this firm include an electric band saw and two versions of a meat slicer capable of handling respectively 3 and 8½ tons of meat per hr.

The EMS-Rotor sausage chopper, supplied by Foodtech, Ltd., is available in capacities from 30 to 250 lb.

Vacuum chopping

The chopping and mixing of many meat products, particularly those containing curing salts, can with advantage be carried out under vacuum, and this is possible with the *Vaku* cutter-mixer marketed by Union Food Machinery and Equipment, Ltd. This is a machine of German design, and is available in capacities of 300, 400, and 600 lb. Like other large bowl choppers of modern design, this machine will handle large pieces of meat without pre-treatment, and will chop to any degree of fineness desired without the generation of appreciable amounts of heat. It may be used with 3 knives and without baffles to give a coarse cut, or with 6 knives and 2 baffles to give a fine cut for boiled and smoked sausages. It is equipped with a disc-type emptying device, and a bowl revolution counter is provided for the control of chopping time.

Where required the chopper can be incorporated as part of an automatic production line. In this, the chopped mix is emptied into a *Ball Press*, in which the meat is compressed under a variable degree of vacuum. It is then filled into cylinders that run on a railway system to a battery of filling machines. Here the cylinders are raised to the level of the filling machine by a hydraulic lift and fitted into the filler as required—the cylinder becomes, in fact, the barrel of the filler.

Union Food Machinery and Equipment, Ltd., also make a wide range of other products for meat processing, and their *Autovac* packaging machine is described later in this article.

Horizontal chopper

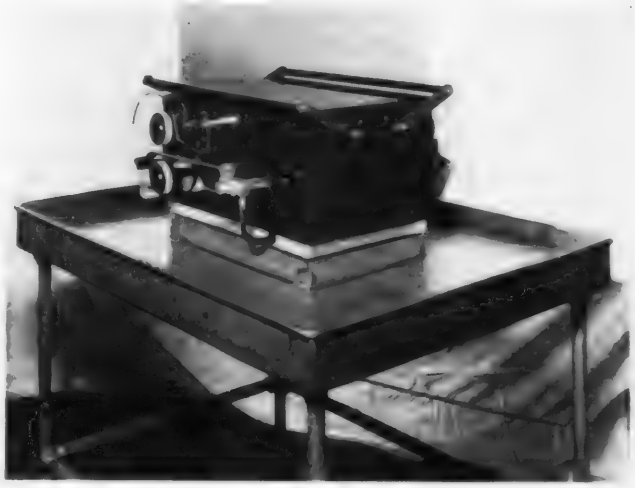
A range of meat processing machinery is also supplied by Stokes and Dalton, who confidently claim that they can supply the butcher with anything except meat. Their heavy-duty twin cutter and grinder is equipped with 2 motors, each of 5½ h.p. which can be coupled together to give a double power transmission or to allow the continued operation of the machine should one motor fail.

The same firm also provide a *Rapid* chopper, which is really a mixer and chopper combined. It will handle fist-sized pieces of meat, and the 2 cutting knives revolve in a horizontal plane at speeds of up to 2,900 r.p.m. By the substitution of a mixing unit

for the knife unit, auxiliary ingredients can be mixed in with the main sausage mix, etc., in a few seconds. The machine is closed during operation, but a grill in the cover permits the addition of liquid, ice, etc., during chopping. The cutting bowl, which does not revolve, can be tipped for emptying and cleaning and locked in this position.

Other machines marketed by Stokes and Dalton include sausage filling and linking machines similar to those already described, band saws, hydraulic cutting machines, and bacon de-rinding machines. Their *Townsend-Piccolo* bacon de-rinder has been developed for the medium and smaller factory where there is none-the-less a need to replace costly hand operations by a mechanised process.

Another interesting machine is the *Hollymatic* steak and patty moulding machine, which is completely automatic in operation and will turn out as many as 2,100 patties per hr. Size and shape of the patties is freely variable, according to the type of mould plates and hopper bottoms used, and exact replication is claimed for the machine. The patties are interleaved with paper as they are produced.



The Wetter sausage spooling machine is used to transfer sausage skins to the filling tube.

Smaller mincers

Machinery which is suitable for the smaller manufacturer is made by Crypto, Ltd. This includes 3 sizes of mincer, with capacities of around 500, 700, and 1,200 lb. per hr. respectively, working with $\frac{3}{8}$ in. plates, and bowl choppers of 20 lb. and 40 lb. capacity. Motor size on the mincers increases progressively in a $\frac{1}{2}$, 1 and $1\frac{1}{2}$ h.p. series, and standard equipment includes four 4-bladed knives and four plates ($\frac{1}{8}$, $\frac{3}{16}$, $\frac{3}{8}$, and $\frac{1}{2}$ in.) as well as a medium-sized filler tube and a feed stick.

Crypto also manufacture a number of vertical mixers of different capacities. The machines have an epicyclic mixing action, and are available with a range of different mixing devices, including beaters, whisks, and dough hooks. Attachments include mincer, slicer, shredder and grater, and a strainer for purées, soups, etc.

Crypto, Ltd., also feature amongst their products a gravity-fed food slicer, powered by a $\frac{1}{4}$ h.p. motor, which is suitable for cooked meats and other products.

The Vaku cutter-mixer, supplied by Union Food Machinery, is available in sizes up to 600 litres capacity. It may be operated under vacuum.

Breakers and disintegrators

Several machines for the disintegration and comminution of meats are included in the Scott-Rietz range of equipment made by George Scott (London), Ltd. Their *Prebreaker* is a heavy-duty unit consisting of rotating hammers running between stationary anvils. The material is broken, sheared, or crushed, and fed forward through the unit. Slow operating speeds give high torque enabling heavy, tough materials to be handled with minimum wear, little maintenance, and low power consumption.

The machines are used for the preliminary size reduction of green bone for soup stock preparation, frozen meat blocks, fish, and vegetable materials, either as an integral part of the Scott-Rietz *Disintegrator* or as a separate size-reduction unit. Special stainless steel models are available with hinged split body giving complete access for cleaning.

The *Extructor* is a modification of the *Prebreaker*, and is used for frozen meat blocks for potted meat, soups and stews. It differs only from the *Prebreaker* in that it is designed to handle softer materials and is fitted with an orifice plate so that the product is literally extruded through this plate. Units are available to handle extremely large blocks of material and again the unit is available in stainless steel if required.

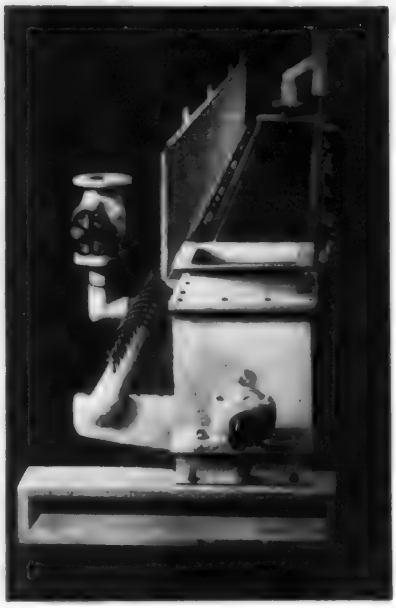
Scott-Rietz *Disintegrators* are built as vertical or angle machines and fitted with a secondary discharge to allow for the continuous separation of resistant material.

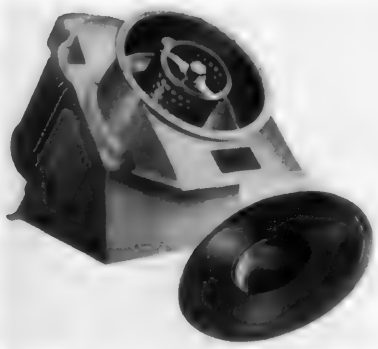
For food comminution the angle machine is preferred because of its hygienic construction and accessibility. It is used for the production of baby foods, potted meats, soup stock, fish paste, and fruit and vegetable materials.

All contact parts are in stainless steel and the unit can be rapidly dismantled for cleaning. It is fitted with a 360° screen giving maximum throughput and constant particle size.

Other machinery in the Scott-Rietz range includes the *Thermascrew*, a screw conveyor equipped with a hollow shaft and jacketed trough through which a heating or cooling medium can be circulated. It is used as a continuous cooker for meat and fish products. For batch operations, two hollow screws run side by side, and the unit can be used for complete mixing and cooling operations on weighed constituents.

In the *Thermascrew* blanchers, open steam is injected into a trough containing a helical screw, which carries the product along and mixes it thoroughly as it is heated.





Above: **The Scott-Rietz disintegrator, designed to give uniform fine grinding with instant homogenisation.**

Left: **Models of the Scott-Rietz Thermascrew blancher are available for use with live steam only or hot water.**

Steak tenderiser

An interesting machine which has appeared on the market recently is the *Steakmaster*, made by the Hobart Manufacturing Co., Ltd. The machine contains a number of blades designed to pierce and thereby tenderise cuts of meat, and is also capable of blending and knitting together meat and other ingredients. It can thus be used for welding slices and trimmings into whole pieces, as well as for the incorporation of onions, cheese, and other ingredients into fabricated savoury steaks.

The machine can also be used for slicing vegetables, as well as for crumbling biscuits and dry bread.

Meat caser

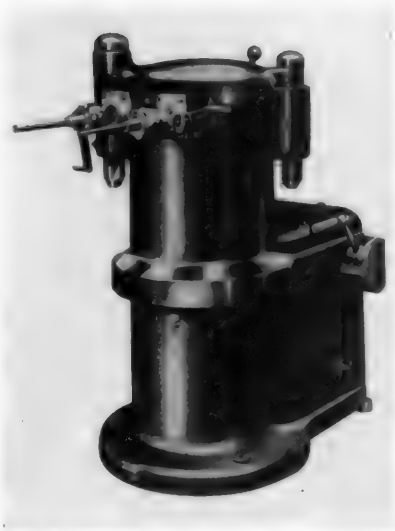
The *Meta-Press*, a machine first introduced by Viskase, Ltd., for moulding and casing boneless hams, was described and illustrated in our January issue (p. 37). It has now been shown to be equally suitable for the production of cooked silversides, briskets, and similar products. The machine eliminates hard stringing, and as the meat is pneumatically pressed it is more compact and less likely to flake on slicing. The product is evenly shaped and hygienically packed, in a fibrous casing, which exerts even pressure throughout the whole length of the meat so that there is no spring when it is cut.

At present the moulds of the *Meta-Press* will take whole brisket, but silversides have to be cut in half. After salting the meat is cased by the machine and can then be cooked in the case, which is said to help in the retention of moisture and flavour, reducing cooking losses and increasing the yield.

Meat presses

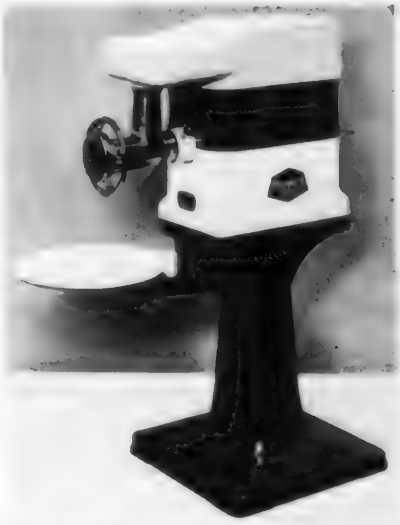
A considerable variety of meat presses is made by R. W. Bollans and Co. (Equipment), Ltd., who have improved their products over a period of 30 years. The presses are made of aluminium, and shapes available include pear-shaped ham presses, rectangular meat and sandwich presses, and round tongue presses. Several sizes of open rectangular moulds are also made. To facilitate cleaning of presses and moulds, Bollans make a washer equipped with 3 rotating brushes, which operate inside a water bowl. The presses are held over the brushes, which force the water contained in the bowl up in the presses, at the same time thoroughly cleaning them of adhering matter. Any size of press can be cleaned. The bowl is of heavy cast aluminium, and the cleaner, which is known as the *Adelmann*, is fitted with a $\frac{1}{2}$ h.p. electric motor to power the brushes.

Bollans also market a variety of Continental meat processing equipment, including Gjerstrup dehairers, black scrapers, and singeing furnaces for bacon factories. They also market casing cleaning machines of Swedish



This electrically powered sausage filler is made by J. C. Wetter and Co., Ltd. It has a capacity of 150 lbs.

The Bollans bowl bogie is made of heavy gauge tubular steel and is mounted on ball bearing castors.



The Crypto A.C.22 mincer, a pedestal-mounted machine of distinctive appearance. A table model is also available.

manufacture. These are furnished with scraping rollers of stainless steel, the position of which can be easily changed by hand for different casings. Models suitable for large and small slaughter houses are available.

Bollans also manufacture a *Bowl Bogie*, which is one of their most recent introductions. This consists of a heavy gauge aluminium bowl (made in several sizes) mounted on a tubular steel frame equipped with castors. A rigid polythene bowl is also available.

Casings

Natural casings are marketed by the Nottingham Butchers' Products and Casing Co., Ltd., who specialise in *Poplar* brand sausage casings. Sheep, hog and beef intestines are cleaned, scraped and selected for size, and then salted down in bundles of 100yd., after careful examination for pin holes. The company has produced casings during the whole of this century, and has recently opened a new factory to cope with increased demand.

A range of artificial casings is made by Viskase, Ltd. This includes *High Stretch* and *Standard Stretch* casings, which are available in clear, red, and amber colours. The *High Stretch* has a maximum stretch of about 60% on stuffing, and is used largely for large sausage items such as poloni, salami, etc. The *Standard Stretch* with a maximum stretch of about 30%, is used for products which are processed in their casing, such as large sausages, meat loaves and hams.

Zephyr casings, on the other hand, are thin-walled casings which shrink on drying in contact with the product, considerably enhancing its appearance. Like the casings described above, they may be printed in many attractive colour designs, and are used mainly for pre-cooked loaves and hams, and for smoked sausages of all kinds.

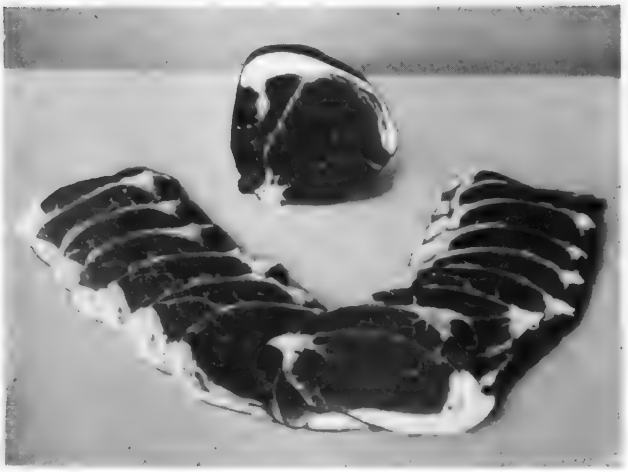
Fibrous casings with many uses, particularly in connection with the *Meta-Press* previously described, are also made by Viskase, Ltd. Another of the firm's specialities is *Nojax* casing, a small-diameter cellulose tube which is used principally in the manufacture of fresh and smoked skinless sausages. The casings are non-toxic and unaffected by heat and moisture, and are available in a range of sizes. Viskase are also agents for *Ty* linker machines for skinless sausages and have recently issued a booklet giving details of skinless sausage production, for which they are willing to provide recipes and any necessary advice.

New fibrous casing

The *Hypak* fibrous sausage casing, made by the Hypak Division of the Oppenheimer Casing Co. (U.K.), Ltd., is a strong synthetic casing said to allow excellent smoke penetration whilst at the same time retarding moisture loss. It is available in a natural and cream finish, and while it is said to resemble natural casing in appearance it can be printed on.

Another new Hypak product is a natural casing package which is designed to minimise the adverse effects of light on natural casings. The pack is made of a specially developed film containing pigments which exclude light of shorter wavelengths. The film is moisture proof and odourless, and is slightly stretchable to give a tight pack which can be rendered air-proof and moisture-proof by sealing and tying.

One of the latest uses for Hypak products in the meat trade has been in connection with treatment for the elimination of *Cysticercus bovis*. Treatment of meat for the elimination of this organism involves deep freezing for 2 to 3 weeks, during which time the meat may suffer from severe surface dehydration. Specially designed *Hypak* polythene bags have recently been used for enclosing quarters of meat during this freeze-treatment, and excellent re-



This cooked half silverside is moulded and pressed in a Meta-Press and encased in a Visking Fibrous casing.

sults in the prevention of surface discoloration, dehydration, and weight loss are said to have been obtained.

Cryovac film

Dewey and Almy, Ltd., who market *Cryovac* bags for the packaging of poultry and other meats, have now introduced the film in flat sheet form. The film is essentially a vinylidene chloride vinyl copolymer, and has a multidirectional shrink of up to 40%. It will therefore mould itself to the contours of many articles wrapped in it. It is highly impermeable to oxygen and moisture vapour, and has a high degree of sheen and transparency. It can also be readily heat sealed.

Vacuum packaging

Increasing use is being made for vacuum packaging of *Metathene*, the polythene-coated cellulose film made by the Metal Box Co., Ltd. This low-permeability film can now be printed in various colours, the printing being sandwiched between the two layers of the film. Bags made of the film have strong polythene - to - polythene fin - type welded seals, and are liquid and powder tight. They are widely used for vacuum-packed bacon, as well as for many other foods.

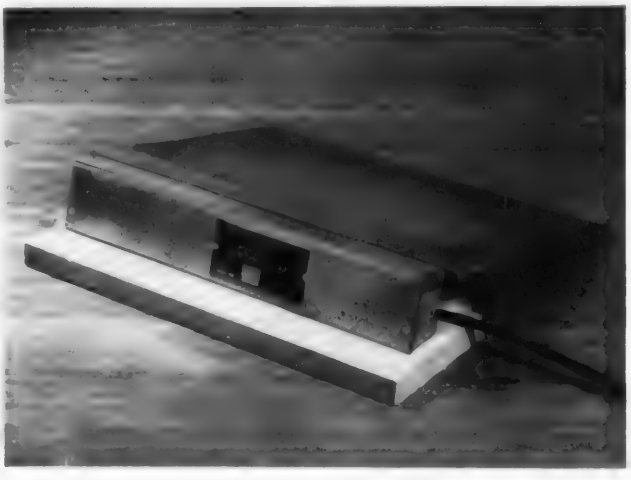
The *M.B.* 24 vacuum sealing machine, which was illustrated in our November, 1957, issue (p. 527), will seal bags of *Metathene* and other heat-sealable material at a rate of 25 to 30 packs per min. (or multiples of these speeds if the bags are small enough to be placed side by side on the belt). The machine incorporates an endless intake and discharge belt, a high-vacuum evacuating chamber, and thermostatically controlled sealing bars. It is hand fed, but otherwise fully automatic.

A vacuum packaging machine, the *Autovac*, is also supplied by Union Food Machinery and Equipment, Ltd., and is recommended for use with heat-sealable cellulose bags. The machine is equipped with changeable filling plates, on which the bags to be sealed are placed prior to the plates being inserted into the machine. Vacuumisation and sealing are accomplished in 4 to 6 sec., and 6 bags of normal size can be handled at once, giving a throughput of some 40 bags per min.

Cellulose film

British Cellophane, Ltd., also feature a polythene-coated cellulose film, *Polycell*, in their range of products, as well as various grades of their well-known *Cellophane* film. *Cellophane* MSAT is a moisture, air, oil, and dust proof film which can be heat sealed, and is available in 300, 400, and 600 gauge. It is used for packaging bacon, ham, luncheon meat and a range of other foods. *Cellophane* MSAT 300/30 has similar properties but is softer and retains its flexibility at very low temperatures, which makes it suitable for packaging items such as sausages that are to be quick-frozen. Type QSAT film is also heat-sealable but although water resistant it is highly permeable to water vapour. It is recommended for use wherever cool temperatures are not possible. Type PT film is not heat sealable and is permeable to moisture, but its impermeability to grease and dust make it a useful light wrapping for many meat products.

Developed for the small trader, the *BCL Bias-wrap and Sealing Aid*, made by the same firm, has been designed to facilitate the quicker and neater wrapping of trays in *Cellophane* film. It consists of a narrow heater bar mounted on a solid asbestos base, with a curved metal forming plate fitted in front of the bar to facilitate folding of the overlapping film. It may be modified quite easily by removing the forming plate and replacing it with a slop-



The BCL Bias-wrap and Sealing Aid makes for faster hand wrapping with Cellophane.

The Rotoheat reel oven (left back) and the Airflowmaster travelling oven (right front), both made by Thomas Collins and Co., Ltd.

ing platform, when the aid can be used for applying wraps to bacon, sausages, luncheon meat, etc.

Paper wrap

A useful material for wrapping fresh meat and certain types of meat products is *Wetwrap*, made by Peter Dixon and Son, Ltd. This is a wet-strength resin-bonded paper which has the power to absorb water and other fluids without disintegrating. It is significantly cheaper than greaseproof or parchment and has recently been awarded the Certificate of the Royal Institute of Public Health and Hygiene.

Ingredients

Several firms specialise in the manufacture of rusk, including Cottage Rusks, Ltd., who make yeastless rusk as their sole product. The rusk is produced in a modern factory equipped with automatic machinery, and is not exposed to the atmosphere or to contact by hand after the initial baking process. The automatic nature of the process is said to give a highly uniform product, is claimed to be highly absorbent, free from brown particles, and of high bacteriological standard.

Lockyers (Sapitaw), Ltd., also manufacture two grades of sausage cereal, known respectively as *Sapitaw* and *Moraw*. Suitable granulations are produced for use in all types of sausage, canned meat roll, meat and fish pastes, etc. The rusk is said to be highly absorbent and free when wetted, and is manufactured from selected wheats milled on the premises.

A complete sausage meal, *C.S.M.*, containing rusk and seasoning is made by a patented process by C. Herendeen and Co., Ltd. The meal is not made to any set formula, but is compounded with the desires of a particular customer in mind, and at the present time over 200 types of *C.S.M.*, varying in tint, seasoning, and consistency, are made.

A large range of rusks for various purposes, sold under the name *Nukrisco*, is made by Stokes and Dalton, Ltd., who also provide seasoning for all types of meat product. *Pinjar* seasonings, made by T. Lucas and Co., Ltd., also enjoy a high reputation, as do the same firm's *Ruskit* cereals. The firm are also agents for *Superflo Weino* skinless sausage casings and *Ty* linkers for skinless sausage manufacture, and have a comprehensive advisory service.

Phosphates

A phosphate additive highly recommended by the makers for the prevention of sausage discoloration is *M.S.B.*, made by Foodtech, Ltd. The additive also permits higher quantities of fat to be incorporated in the mix, and is said to be without glutinous effect. When used during curing, at the rate of 1 oz. to 1 gal. of brine, it is said to speed penetration of the brine and to prevent loss of meat juices, flavour, and fat during subsequent cooking, as well as helping in the retention of colour.

Foodtech, Ltd., are willing to give full details of the use of *M.S.B.*, as well as to provide recipes and other information for the production of a variety of fresh and cured meat products.

Ovens

Ovens suitable for the manufacture of a variety of meat products such as pies, pasties, sausage rolls, faggots, etc., are supplied by Thos. Collins and Co., Ltd. For the large-scale manufacturer they recommend their *Airflomaster* and *Heatflo* travelling ovens which may be used in conjunction with conveyors to give a completely mechanised flowline. For the smaller manufacturer the *Rotoheat* reel oven is more suitable, and is said to give excellent results even when operated by unskilled labour.

The ovens may be heated by oil, electricity or gas and ancilliary equipment includes pie machines, pastry brakes, pie wrapping machines, tin greasers, etc.

Correct cooling of pies and other products is equally as important as correct cooking, and Collins have a division, Conditionedair, Ltd., which specialises in cooling and air conditioning, and offers travelling and compartment-type coolers for all baked products.

G. and R. Gilbert, Ltd., can also offer a wide range of ovens, including *Fyna* automatic reel ovens, which are made in over 100 sizes and types. Capacities range from 5 pans of 30 × 18 in. to 72 pans of 30 × 20 in., and models are

(*Concluded on page 298*)

Additives for Meat Products:

A Critical Survey

1. POLYPHOSPHATES

By A. McM. Taylor, B.SC., PH.D., F.R.I.C.*

Many substances have been suggested for improving the quality of meat products. What are their value? In these articles Dr. Taylor, of the British Food Manufacturing Industries Research Association, gives a critical examination of published work in this field. He begins with one of the most commonly recommended additives, the polyphosphates.

OF all the additives suggested for use in meat products none have aroused as much interest as the polyphosphates. Originating in Germany some ten years ago, they have been widely developed both on the Continent and in the U.S.A. In spite of this widespread interest, however, there is still a great deal of uncertainty regarding their action and much conflicting information is to be found in the published literature. To a large extent this is almost certainly due to the very complex character of the meat to which the polyphosphates are being added. It must be taken as axiomatic that meat is not a homogenous raw material, either for manufacturing or experimental purposes, and all who work with meat will agree that replication of experimental results, even under laboratory conditions, is far from easy. A further difficulty in attempting to evaluate a polyphosphate under practical conditions is the fact that the criterion of assessment (e.g. cooking loss in hams) may well be affected by variation in other factors (such as degree and duration of cooking) which cannot entirely be avoided in large-scale processing. For these reasons the effectiveness of a polyphosphate must be thought of in statistical terms, by which is meant that it cannot be established by a single trial. Individual trials will, in fact, not normally give identical results, but an effective additive may be expected to show an average improvement over a reasonable number of trials. A good deal of confusion and disappointment may be avoided if this fact is kept firmly in mind.

For the English manufacturer the situation is further confused by the fact that polyphosphates are commonly offered in the form of proprietary blends of undisclosed composition, so that there is no basis of comparison of competing products, other than practical trial. The use of polyphosphates is, moreover, covered by patent claims. Only one patent has so far been sealed, covering the use of a mixture of one or more alkali metal pyrophosphates together with one or more alkali metal ortho-, meta- and/or polyphosphates. This patent does not prevent the use of a single phosphate compound but other patents, at present under opposition, would extend the protection to include the addition of a single salt.

Nature of the polyphosphates

The term polyphosphates is loosely used to cover a variety of substances formed by polymerisation of two or more molecules of the simple orthophosphate. The structure of this compound (in the form of its sodium salt, Na_3PO_4) can be represented as shown, and polymerisation occurs by the sharing of bridging oxygen atoms. From the point of view of meat additives, the compounds of importance can be grouped into three categories:

(i) Linear polymers of relatively low molecular weight. These are formed by the linking of two or more orthophosphate molecules. The first two members of the series, pyrophosphate and tripolyphosphate, have crystalline, water-soluble sodium salts which are of considerable importance as additives. They are built up as illustrated opposite.

Higher members of the series can be detected in solution, but the sodium salts have not been isolated.

(ii) Linear polymers of high molecular weight. These have as many as 100 or more units in each molecule and may contain branching chains and possibly some cross linkages. Examples are Madrell and Kurrol salts. These are crystalline alkali metal salts and are insoluble in water although they can be dispersed in solutions of salts containing a different alkali metal. The resulting solutions are often of high viscosity and it is the salts of this type which give rise to the "viscous" phosphate mixtures of commerce.

(iii) The polyphosphate glasses, prepared by rapidly quenching Na_2O-P_2O_5 melts. These contain a mixture of polymers of varying chain length. The commonest example is the commercial product *Calgon*, which has an average chain length of about 12 units.

Well-defined cyclic metaphos-

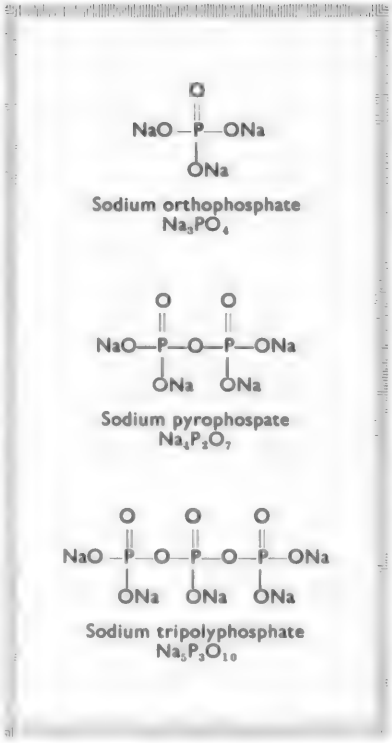
* Assistant to the Director of Research, British Food Manufacturing Industries Research Association.

phates of composition $(NaPO_3)_3$ and $(NaPO_3)_4$ are also known, but these are not of technical importance and commercial phospate mixtures are likely to be based on permutations of the compounds of groups (i) to (iii) above. This still leaves, however, a considerable field of variation.

Fields of use of phosphates

Three main fields of use are of interest—in ham curing, in canned comminuted meats, and in sausages. The principal advantage claimed for the use of phosphates is an improvement in water retention, leading in the case of hams to a reduction in cooking losses and to the development of a firmer and plumper texture. Secondary advantages in respect of colour improvement have also been claimed. Evidence in the literature is not unanimous but there are authoritative suggestions that sodium triphosphate, in particular, has a statistically significant effect in reducing cooking losses in hams. The Annual Report of the Danish Meat Research Institute for 1955 states that sodium tripolyphosphate reduced the loss of weight during the processing of hams and improved the quality of the meat. Similarly the 1956 Annual Report of the American Meat Institute Foundation states that sodium tripolyphosphate significantly increased the yield of fully cooked hams. On the other hand Möhler and Kiermeier,[1] working in Germany, recently reported failure to obtain a significant improvement with two commercial phosphate additives; they do not, however, specify the additives concerned. The Danish Report also refers to a decrease in fat and jelly separation and an improvement in consistency from the use of sodium tripolyphosphate in ground meat products.

Sodium tripolyphosphate is suitable for use in a pumping pickle from the point of view of solubility. In the A.M.I.F. Report reference is made to the effect of the presence of traces of calcium and magnesium introduced by hard water or in the curing salt, and it is stated that



with sodium tripolyphosphate at low levels some precipitation may occur but that at higher levels clear pickles are obtained owing to the sequestering action of the polyphosphate. With sodium pyrophosphate, precipitation due to traces of calcium or magnesium may occur unless salt and water of high purity are used. Sodium pyrophosphate is also less soluble *per se* and is less satisfactory than tripolyphosphate for this reason.

The A.M.I.F. Report states elsewhere that hams cured with sodium tripolyphosphate and sodium hexametaphosphate gave a darker initial colour than control hams and that, as a result of this, the shelf life was slightly increased although the rate of fading of the colour was not effected. Henrickson, Sleeth and Brady[2] have made observations on the effect of phosphates in association with ascorbic acid and sodium ascorbate. They report that hams cured in brine containing ascorbic acid and sodium hexametaphosphate had a colour equal to that given by ascorbic acid alone. In experimental cures of *longissimus dorsi* muscles using phosphates in association with sodium ascorbate they preferred sodium hexametaphosphate to sodium tripolyphosphate from the colour point of view.

Both the American and the Danish Reports sound a note of caution. The A.M.I.F. Report refers to snow-like crystals of hydrated disodium hydrogen phosphate forming on hams containing 0·5% of sodium tripolyphosphate and to a variable extent on hams containing lower levels, while the Danish Report mentions the occurrence of increased corrosion and discolouration when polyphosphate-treated meats are processed in cans. The possibility of increased corrosion arising from the use of polyphosphates in canned cured meat is referred to in the technical literature but the situation is somewhat indefinite and there is reason to believe that polyphosphates are in fact being used without prohibitive trouble in this respect. An anonymous American writer, in a note in the National Provisioner[3], has suggested the introduction of a sacrificial aluminium cleat to combat the possible corrosive effects of phosphate-treated meats.

Use in sausages

Published work on the use of polyphosphates in sausage preparation is confined to the Continental type of product—often made from cured meat, with a very low cereal content and customarily cooked or smoked before sale. In these circumstances any increase in water-binding capacity duty to polyphosphates would have obvious advantages, but it is less easy to foresee the potential benefits of such an increase in the traditional English sausage, with its relatively large cereal content and generally coarser chop. Claims are made, however, for beneficial effects of phosphates in these products in other directions. These claims are not easy to assess, largely as a result of the variability in raw material and processing already referred to, but there is sufficient smoke to guarantee some fire, and it is significant that the Report on Sausages of the Food Standards Committee (1956) refers to the use

of phosphates in sausages "to improve the emulsification and to retain the fat in the sausage on cooking."

Choice of phosphates

A question which is frequently —and quite naturally—asked is "Which is the best phosphate for use in sausages?" It is unfortunate that to this deceptively simple question there is no simple answer since the effects of individual phosphates, and still more so the differences between them, are liable to be obscured by other variations in formulation and processing, many of which are difficult to control. There have, however, been a number of laboratory studies in which various phosphates have been compared with reference to their effect on the water-binding capacity of meat. Bendall,[4] using minced rabbit muscle, tested orthophosphate, pyrophosphate, *Calgon* and a phosphate glass containing 20-30 phosphate residues per molecule. He found that, in the presence of 1% of salt, pyrophosphate exerted a specific effect, which the other phosphates did not show, in increasing both the uncooked and the cooked volume of the muscle mince. Körmendy[5] examined the effect of 0·5% of metaphosphate, orthophosphate, pyrophosphate and the proprietary preparation *Plasmal* on the water-binding capacity of beef mince containing 2·5% salt. *Plasmal* showed the largest effect but pyrophosphate and in this case metaphosphate were also effective. Disodium hydrogen phosphate altered the texture of the meat, which became crumbly and doughlike. Swift and Ellis[6] used a mince prepared from frozen beef in an extended examination of the influence of other factors (temperature of application, time allowed for interaction, ionic strength and pH) on the effects of orthophosphate and pyrophosphate mixtures. They found a considerable degree of dependence on all the factors studied, but failed to confirm the specific effect of pyrophosphate noted by Bendall. In a later paper[7] they went on to consider the use of a number of phosphate mixtures, both commercial and compounded from known phosphates, in the preparation of Bologna sausage. Unfortunately this is again a smoked cured-meat sausage, and much of the authors' interest is centred on moisture losses during smoking. They did, however, use a novel technique, involving the determination of the tensile strength of strips cut from the sausage meat, and some interesting observations were made. Thus it was shown that when the ordinary curing agents were applied singly, only salt increased the cohesion of the meat. Addition of phosphate combinations based on 65% tetrasodium pyrophosphate, 10% acid sodium pyrophosphate and 25% of either sodium hexametaphosphate or potassium polymetaphosphate markedly increased the cohesion of the meat, as also did a commercial phosphate mixture. Another interesting observation was that the temperature rise during the comminution of the meat was markedly reduced in the presence of the phosphate mixtures, but was increased by the presence of salt. It is clear that the picture is still far from complete: there remain unresolved anomalies between the observations of different workers, and only a limited part of the field has yet been covered.

Mode of action of the polyphosphates

Basically, the water-binding capacity of meat is a function of the degree of hydration of the muscle proteins, and any effect of polyphosphates on water-binding is to be interpreted in these terms. A good deal of confusion has arisen in discussions of the mode of action of the polyphosphates from the fact that the addition of a polyphosphate to meat necessarily alters the concentration of salts in the meat and may also alter its pH, both of which alterations in themselves affect protein hydration.

Addition of common salt (sodium chloride) to meat increases the swelling and degree of hydration of the protein and the salt commonly added for flavouring purposes will have a significant effect also from this point of view. This action of salt is not confined to muscle proteins; other proteins are similarly affected. The effect of pH is linked with the electrical charges on the molecule. Proteins contain carboxyl groups, which can ionise to give a residual negative charge and amino groups giving a residual positive charge on ionisation. The exceedingly complex protein molecules contain large numbers of groups of both types and the overall state of charge of the molecule will depend on the relative balance of ionisation and this in turn is a function of pH. At the particular point where equal numbers of carboxyl and amino groups are ionised the molecule as a whole will be electrically neutral. This is known as the iso-electric point and at this point hydration of the protein is at a minimum. For meat muscle protein, the iso-electric point occurs at about pH 5·3, and at this pH value water-binding capacity is at its lowest, increasing progressively as the pH moves away from the iso-electric point. The pH of normal meat lies somewhat on the alkaline side of the iso-electric point and in this region a rise in pH value will bring about an increase in water-binding capacity. Polyphosphate mixtures can be adjusted over a considerable range of pH by varying the proportions of partly-and fully-neutralised phosphates which they contain and commercially available mixtures show appreciable variations, extending well on the alkaline side of neutrality. The use of an alkaline phosphate mixture will raise the pH of the meat and there will be some improvement in water-binding capacity for this reason alone. The interesting question arising is whether, when due allowance is made for the two general effects just discussed, polyphosphates do or do not exert a further specific effect on the water-binding capacity of muscle proteins. The consensus of opinion in the literature appears to be that they do although there are still dissentient voices. As regards the mechanism of this specific action

there are two main lines of thought. It was pointed out by Bendall that pyrophosphates (and tripolyphosphates) contain characteristic phosphate groupings similar to those found in adenosine triphosphate (ATP), which is concerned in the living muscle with the utilisation of metabolic energy for muscular contraction. He suggested that these inorganic phosphates might therefore be able, like ATP, to split the link between actin and myosin, the two components of the main contractile protein of muscle, and that their specific hydrating action was based on this ability. This idea is supported by Henry, Billon and Haouza,[8] who refer to some little known work by Palmine, reported in a Russian journal. Palmine showed that in post-slaughter storage of beef muscle the solubility of acto-myosin in salt solutions decreased in parallel with the disappearance of ATP and could be restored by replacement of ATP, and that pyrophosphate (but not orthophosphate) similarly increased the solubility of the acto-myosin in refrigerated meat, although less effectively than ATP. He found also that pyrophosphate behaved similarly to ATP in reducing the rigidity of a gel or the viscosity of a sol, of muscle protein.

Sequestering action

The alternative approach, developed largely in Germany and outlined in a review by Hamm[9] lays emphasis on the sequestering action of the polyphosphates, particularly with respect to calcium, on the basis that alkali metal ions are known to promote the hydration of muscle proteins and alkaline earth ions to reduce it. In support of this suggestion it is pointed out that the abifity of various salts to increase the hydration of disintegrated beef muscle runs parallel with their ability to combine with alkaline earth ions and that other known sequestering agents also promote hydration. An interesting sidelight on this view is provided by the work of Arnold, Wierbicki and Deatherage,[10] who studied the post mortem movements of sodium, potassium, magnesium, and calcium in beef. Sodium and calcium were continuously released from the muscle proteins, potassium was absorbed after the first 24 hours and magnesium was released during the first 24 hours (and also between 6 and 13 days post mortem). The net result was an increased charge on the proteins, allowing greater hydration, but in addition the specific effect of calcium removal is regarded as an operative factor. If migration of calcium is taking place in this way in untreated meat, the presence of a polyphosphate (or other sequestering agent) might well be expected to facilitate the action through the straightforward mass action effect of the continuous removal of ionic calcium. In explanation of the action of calcium in restricting hydration it is pointed out by Hamm that calcium, being divalent, may give rise to cross-linking of the peptide chains, blocking access to the polar groups on which hydration depends.

Legal and health aspects of polyphosphates

The pharmacology and metabolism of the polyphosphates were discussed at a symposium held in Mainz in 1957, and the conclusion was reached that no exception could be taken on grounds of health to the addition of polyphosphates in small amounts to foods. The location of this meeting is of interest since the point is sometimes made in argument by the protagonists of the anti-additive school that the use of phosphates in meat products is prohibited in the very country in which they were developed. It is, of course, true that in several German states the use of phosphates is not permitted, but the prohibition is based, not on grounds of health, but on existing legislation against the use of "binding agents". In fact, the question of whether the polyphosphates should be considered as binding agents for the purpose of this legislation has been a very controversial one in Germany. The United States Department of Agriculture has authorised the use of disodium phosphate, sodium hexametaphosphate, sodium tripolyphosphate, and normal and acid sodium pyrophosphate in certain meat products, amounts of up to 0·5% being permitted in hams and shoulders and other cured pork cuts and also in chopped ham.

No specific legislation in regard to polyphosphates exists in this country and their use, like that of many other additives is subject only to the over-riding provision of the Food and Drugs Act, 1955, that "no person shall add any substance to food . . . so as . . . to render the food injurious to health, with intent that the food shall be sold for human consumption in that state." Since the polyphosphates themselves are harmless in the concentrations used, it is necessary only to ensure that the material is of adequate purity and in practice this largely resolves into freedom from excessive contamination by poisonous metals (particularly arsenic and lead) and by fluorine. The Labelling of Food Order requires (with certain specified exemptions) a disclosure of all ingredients present in a prepacked food and an addition of polyphosphates to canned ham, luncheon meat or canned sausages would have to be declared. The First Schedule to the Order permits disclosure as "Emulsifying salts" for, *inter alia*, sodium phosphates when used for this purpose but their function in meat products is outside the scope of this definition and a disclosure in terms of the specific phosphates present should be made.

As already mentioned, the Report on Sausages of the Food Standards Committee (1956) refers to the use of phosphates in sausages. The comment there made, which refers jointly to phosphates and to mono-sodium glutamate added to enhance the flavour of the product, is in the following terms: "Their ability to improve the sausage might result in the consumer being misled as to the amount of meat and fat present, but provided there are minimum standards of meat content and

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The Danish Meat Products Laboratory

By Viggo Enggaard and Mogens Jul

Danish exports of canned meats reached the pre-war level in 1950, and have continued to increase rapidly ever since. In this article the authors describe a new laboratory which has recently been remodelled to help manufacturers to maintain the quality of their products, and to develop new lines.

OVER the last century a fast development of the techniques of food freezing and refrigerated transport has taken place. This development might logically lead to a reduction of the amount of meat that enters into international trade in the form of canned products. Exports of canned meat have actually been decreasing very rapidly for several Latin American countries. Exporters there found it more profitable to export their meat chilled or frozen and have reduced canning operations quite substantially. In a few other countries, however, and especially in Denmark, the development has gone in the opposite direction. As Table 1 indicates, the export of canned meats from Denmark increased from 20,000 metric tons in 1938 to 57,000 m. tons in 1957. The reason behind this large increase is probably the change in consumer habits that has taken place in many parts of the world towards the use of foods in a ready-to-eat form in preference to food that has to be made up and cooked in the kitchen.

This rapid development of the meat canning industry in Denmark increases the need for further activities in the field of research and quality control. For this reason the Danish Meat Products Laboratory recently underwent considerable re-building and reorganisation.

Programme of work

The field of work of the laboratory is that of research and quality control for canned meats and other ready-to-eat specialties. Thus, the laboratory carries out routine quality control of all such products before they are exported. This control includes an evaluation of workmanship, appearance, flavour and taste. In addition, a great many measurements and chemical analyses are made to ensure uniformity and observance of the various regulations in force in the various countries to which the products are exported.

TASTE TESTING ROOM. The judges are persons selected from industry and research. The samples pass on a table from one judge to the next one. The seating arrangement is such that the judges are discouraged from discussing the samples with one another, and sit so that they cannot see each other's facial expressions. An arrangement with a separate booth for each judge is avoided because it tends to make the job less pleasant.

In addition to this the Meat Products Laboratory carries out a substantial amount of research work. This is particularly related to problems of quality of the production of canned meats. Work has been carried out in such fields as the use of bacteriological examination as a measure of keeping quality of canned meats and meats packed in plastic film. Other investigations have been carried out to determine the characteristics of the heat processing data used in the various canning plants with an aim to establishing safer and more uniform heat processes. Other fields of research have included work in the laboratory's pilot plant, where canned and ready meats may be put up and the influence of various components on the quality of chopped or minced meat products tested.

Finally, the laboratory has been active in education and consultation work with an aim towards the improvement of the quality of the Danish production. In the fields of research and education the Meat Products Laboratory cooperates very closely with the Danish Meat Research Institute in Roskilde.

Taste testing laboratory

One of the most important steps in the quality rating of food products is the judging of the workmanship, appearance, flavour, taste, etc., which is carried out by special taste testers—as a rule, technical people from the industry specially chosen for this purpose. It is difficult, however, to carry out such evaluations with the necessary degree of accuracy.

Table I. Denmark's export of canned meat

Year	1937	1938	1939	1947	1948	1949	1950
Weight, 1,000 metric tons...	12·0	20·0	19·7	2·1	6·0	10·4	26·5
Year	1951	1952	1953	1954	1955	1956	1957
Weight, 1,000 metric tons...	44·5	32·7	38·4	44·1	49·2	46·3	56·6

The following requirements must therefore be fulfilled before the products can be judged:

1. There must be several judges; otherwise the results are too inaccurate. At the Meat Products Laboratory there are normally five judges.

2. The judges must agree on a definite scoring scale. A scoring scale of 1-10 is used and at frequent meetings the judges discuss, supported by samples, how the individual steps of the scale should be interpreted.

3. The judges must not know the origin of the samples. All samples are assigned a number and none of the judges know the meaning of this number.

4. The judges must make their judgments independent of each other. Otherwise a single judge's opinion can easily influence the whole group. Therefore, the judges must not see each others' scorings nor their facial expressions and they must not discuss the judging of individual samples before they have been scored.

The arrangement of the present tasting room at the laboratory departs from many earlier set-ups for taste testing. In many places, each judge has a separate booth. There are several disadvantages to this system. Closed in as they are, the judges do not always feel completely free, and if the judging takes a long time there can be some reluctance on the part of the judges to remain in the booth, and this can also influence their judgments. Further, it is almost impossible to provide uniform light in such booths. This is especially important in judging meat products where the colour is very difficult to judge in artificial light.

The Meat Products Laboratory has tried to solve these problems by placing the judges at small tables, one behind the other, with large windows at the left. The samples to be judged are passed by the judges on a row of tables on their right. With this arrangement they sit in the open, unrestrained, with sufficient light from the proper side, yet the individual judges are undisturbed by the others. Naturally there is no discussion during the judging, and even if one judge should show by his facial expression that a sample does not please him, the other judges cannot see this, because they see each other only from the back.

Another big problem in such judgments is to assure that the demands set forth are really those of the customers on the export market. To assure this, comparisons are made at frequent intervals between Danish canned meats and products from competing countries bought on the foreign market. In addition, when a foreign expert visits Denmark, he is often invited to the laboratory to review various products with the judges from the laboratory and to indicate which demands he feels should be made.

Experimental kitchen

The judging rooms adjoin a new experimental kitchen. The two rooms are separated only by large opaque glass windows which can be raised to provide direct connection between the two rooms.

The experimental kitchen serves, among other things, as a place for preparing the samples to be judged. The close proximity of the two rooms is thus very convenient, for example products which should be judged hot can be taken directly from the kitchen to the judges.

However, the primary purpose of the experimental kitchen is to enable experiments on the best possible use of the products in the home. The experimental kitchen will thus come to play an important role in the development of new meat products in the laboratory's experimental sausage-making and canning plants.

PILOT PLANT. The pilot plant is equipped with the usual sausage-manufacturing and can-closing equipment; it also has a retort equipped for rotation of cans and the measurements of internal temperatures in the cans during rotation.

RESEARCH KITCHEN. The research kitchen is used for preparing samples for taste testing and for experiments on the best ways to serve canned foods or on the development of new products. It is connected with the taste testing room by opaque glass partitions that may be raised.

Analytical laboratories

Many things must be taken into consideration in judging meat products, especially taste, flavour and appearance. Other characteristics can be determined by weighing, measuring and by analytical or bacteriological examinations. This applies to such things as flour content, salt per cent., meat content, etc. In a way, these are easier to measure accurately since this can be done objectively. On the other hand, most such analyses are considerably more time-consuming, since they demand, for example, dissolving, cooking, precipitation, weighing, titrating, etc. This work is done in the laboratory's chemical analyses laboratories.

Microbiological laboratory

In addition to quality judging, weighing, and chemical analyses, bacteriological examinations are made of the products exported. For example, a certain number of cans are taken systematically from the production at the various plants and kept in an incubator for a week. After this, the contents of the cans are examined and a bacteriological examination is made if necessary. The results of these examinations give a picture of the product's keeping quality and therefore its suitability for export.

Reporting the judgments

A list of the quality scores given by the judges is sent to the various plants the same day as the tests are made and reach the plants the next morning. An accompanying letter to each plant discloses the code under which their products are listed. The Meat Products Laboratory maintains a card file of all lots of canned meats destined for export as well as the results of all its examinations and analyses.

Punch card equipment

Information on the quality, per cent. of jelly, colour, etc., is very useful for the individual plants. If the persons in charge of production see that the quality of their products is not keeping pace with developments, or that one of their products differs too much from others, it is very important that any fault be corrected immediately. In this case, the daily scoring lists are not enough. They cover only individual samples, so that it may be difficult to see any tendencies. For this reason the laboratory gives a statistical summary in its annual report of the fluctuations in quality which occurred during the course of the year, as well as of the composition and quality of the individual plant's products in relation to the average of the other samples. Unfortunately, these statistics often appeared too late to be of full use to the plants. The laboratory has therefore acquired I.B.M. punch card equipment, on which all of the control results are entered, thus making it possible to compile statistics which can be sent out to the plants in a few hours. It is thus possible to give the factories a summary of the quality of their products in relation to that of others quickly enough to make possible the early detection of any undesirable deviations.

Experimental sausage and meat canning plants

The laboratory's sausage and meat canning plants have been modernised and it is now possible to carry out experiments on the procedure for manufacturing the individual meat products on a small scale. The laboratory has heretofore carried out such experiments, including heat transmission measurements in cans, in the various canning plants and bacon factories. There are, however, some experiments which cannot easily be carried out during production and for which pilot plant equipment is needed. Further, testing of individual special machinery is undertaken. Of the experiments which will be carried out in this pilot plant may be mentioned measurement of the temperature in cans during heat processing while these cans are rotated in an autoclave at a speed up to 50 r.p.m.

Head of the Meat Products Laboratory is Mogens Jul, who is also director of the Danish Meat Research Institute in Roskilde. Other staff members include Viggo Enggaard, in charge of administrative work; J. Torp Madsen, concerned especially with advisory work for the factories; P. E. Jensen, the only chemist in Denmark who has also completed his apprenticeship as a sausage maker, experimental work on sausage and other meat products; Dr. Ida Hessen, microbiologist; and Elly Madsen and Lis Hansen, home economists in charge of experimental preparations of the products for the home.

The Problem of Improving Nutritive Value

With Special Reference to the Enrichment of Foods—1

By E. Menden and H. D. Cremer*

Over two-thirds of the world's population is still grossly undernourished, and even in the better-fed countries specific dietary deficiencies still exist. In this series of articles Prof. Cremer and his co-author examine ways in which nutritional levels may be raised, especially by the supplementation of foods with specific dietary essentials.

The Basis of the Need to Supplement Nutritive Value

A FUNDAMENTAL concept of research in nutrition is that food, to be fit for human consumption, may be composed of many different nutrients, but it must contain certain nutrients in the right amounts and in the right proportions. At present, we know of approximately 50 different substances upon which we regularly depend: these are the essential amino acids, fatty acids, minerals and vitamins. With the exception of breast milk, there is no food in Nature especially designed to satisfy all the nutritional needs of the body; it is, therefore, a challenge to modern nutritional physiology to devise a satisfactory combination of foods which will provide, as far as possible, all the necessary nutrients which man needs.

This challenge to find foods of the best possible composition is thwarted by the deep-rooted eating habits of large groups of the population. Furthermore, the economic structure of the life of our country, and especially the massing of great numbers of people in cities, lead, of necessity, to the multiple prehandling of various foods in order to avoid losses in long-distance transportation and during the storage of supplies. These methods of prehandling result, inevitably, in the loss of nutritive value, which makes the supplementary intake of nutrients of high value necessary. The problem is: how can this best be done?

A short report, based upon the results of research as shown in the world literature over the past several years follows; this considers the causes which lead to the need to supplement nutritive value. Later, we will discuss the possibilities which arise of supplementing nutritive value, with special emphasis on the "enrichment" of food.

I. Surveys of Nutritional Status

Following the last war, undernutrition due to the lack of energy-nutrients was widespread. It is still today a serious problem in many parts of the world; in Germany and in other civilised countries of the world, because of the improvement in the economic situation, and the consequent improvement in nutrition, it is no longer of great import; and this extreme problem is not therefore considered in the following report. However, deficiencies of the essential nutrients in the food of the people—especially of certain vitamins, minerals and proteins—*are* still very significant. Mass examinations of people on the one hand, and statistics obtained from inquiries concerning average consumption of food on the other, serve to determine the extent to which these essential nutrients are provided. Based on survey reports of nutritional status, a comparison between the requirements, and the actual provision, of these essential nutrients follows.

VITAMINS

1. Vitamin A

Requirements: 2,500 I. U. up to 5,000 I. U. per day.[1,2,3,4] Optimum: 5,000 I. U., consisting of 1,000 I. U. of vitamin A and 4,000 I. U. of carotene.[5] In special cases (pregnancy, lactation) the requirement is increased to 8,000 I. U. per day.[2]

The vitamin A supply of the German population was insufficient not only during the war, but also in the years immediately following the war. The average intake was only 700 I. U. per day,[6] or 9%-67% of the recommended level.[4,7] It has been found that a lack of vitamin A causes reduced visual efficiency in diminished light (nightblindness) morbid changes in the skin, and results in diminished resistance to infectious diseases.[6] Today the supply of vitamin A has improved, but it still may not be regarded as optimal.[7,8]

Reports from many other countries regarding the inadequate average supply of vitamin A show that the need for improvement in national nutrition is an international problem.[9,10,11] For example, the visual efficiency of the Eskimo in diminished light is substantially better than that of the Northern European.[12] The cause may well be due to a vitamin A deficiency in the more sophisticated diets.

2. Vitamin D

Requirements: 400 I. U. per day.[5] The vitamin D requirement of humans is variable, com-

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plex, and difficult to assess. For instance, where sunlight is plentiful, the addition of vitamin D to food is of little importance.[13] The normal requirement is increased for children, and during pregnancy and lactation;[14] hence, the lack of vitamin D primarily affects children and young people. A high incidence of rickets was reported even as recently as 1952, and this was probably caused by an insufficient supply of vitamin D.[6] Food supplemented with vitamin D is relatively scarce: normally, an adequate supply of vitamin D for adults is assured (provided a balanced ratio of calcium and phosphorus is maintained).[13]

3. Vitamin E

The daily requirement of vitamin E may be set between 10-25 mg.[15] An absolute vitamin E avitaminosis has never been observed in humans. One may assume, however, that for many people the intake of vitamin E is suboptimal, or lies very close to the suboptimal borderline.[16] Mass examinations of the public to discover vitamin E deficiencies are not known. Nevertheless, attention may be drawn to the importance of an increased vitamin E supply,[7, 17, 18] even though a demand for food supplemented with vitamin E has not yet been expressed.

4. Vitamin C

The daily requirement of vitamin C lies between 30 mg.[3] and 125 mg.[6] A daily intake of 75 mg. should be sufficient for an optimal supply.[4,5] Vitamin C deficiency, in its extreme form (scurvy), was reported as early as 400 B.C.[6] Marked vitamin C avitaminosis is now seldom observed; it plays practically no part in normal nutrition. However, there is a wide range between complete deficiency and optimal supply. The inadequate provision of vitamin C, which showed itself as reduced efficiency and reduced resistance to infectious diseases, has been noted in Germany, particularly after the war.[6] From 1941 to 1945 the average intake, in Germany, was about 40 mg. daily, or only 53% of the requirement.[7] Later, a nutrition survey made on a large number of people in West Berlin (1951-52), established the existence of an insufficient supply (about one half of the requirement) of vitamin C, especially during the winter and spring. From the evidence concerning German nutrition during the period 1935 to 1952, it must be concluded that the consumption of foods rich in vitamin C (vegetables, fruit, potatoes) is steadily declining,[19] and the average intake of vitamin C cannot be described as optimal. Similar inadequate vitamin C intakes are reported from other countries. Nutritional physiology demands a higher intake of Vitamin C.[9,10,11,20]

5. Vitamin B Group

Vitamin B_1. The estimated requirement of vitamin B_1 lies between 0·6 mg. per day (minimum) and 2·4 mg. per day (optimum).[4,6,7,21,22,23] The desirable daily amount of vitamin B_1 intake is given as 1·7 mg. by the committee of the German Nutrition Association. Food should contain one micro g. of vitamin B_1 for every "non-fat" calorie,[5,6] Beriberi, the disease most characteristic of B_1 deficiency, plays a large role, even today, in various regions of the world.[9,24,25] The danger of such a serious B_1 avitaminosis is not present in Germany. Vitamin B_1 malnutrition can be dangerous, however, as B_1 is of great importance in metabolism. A continued reduction in the intake of Vitamin B_1 leads to a fall in efficiency and in initiative; rapid exhaustion and sleeplessness; disturbances in the gastro-intestinal tract and the circulatory system of the heart; and, in some cases, to a mild anaemia; the greater the B_1 deficiency, the more these symptoms are intensified, and a general diminution of physical fitness results. All symptoms rapidly disappear on the administration of B_1.[6]

A comparison of the amounts of thiamin in the German diet at different times shows a gradual decrease in the B_1 intake during the 19th and 20th centuries. During the 18th century, 2·3 mg. of B_1 was being taken in the daily diet; in the 20th century an average daily intake of only 1·1-1·5 mg.[23] is reported. An adequate intake of vitamin B_1 in the German diet was reported in 1947, but this can be explained as having been due to the high intake of bread and potatoes, which provided the necessary daily minimum requirement—often even the optimum daily requirement of 1·7 mg.

During the war, experimental surveys covering the supply of B_1 to the urban population showed that 27% of those examined in 1941-42 exhibited a B_1 deficiency; however, in 1943 this figure fell to only 13%. The cause of this was that, in the intervening time, the addition of bran and barley flour to bread, and an increase in the flour-extraction rates, had been introduced.[26] On the other hand, the declared daily average intake of 0·20-0·65 mg. in Germany during the war (based on the statistics of improved nutrition), was probably too low because of the high bread intake, and the resultant high "non-fat" calories.

The improved supply of a wider range of foods after 1950—foods which were low in B_1 or from which B_1 was entirely absent——led to a decrease in the consumption of bread and potatoes, and, in consequence, to the danger of general vitamin B_1 deficiency.[27] Thus, the average daily bread intake per person in 1951-52 was only 259 grams, compared with 316 grams in 1949.[23] In January, 1953, the German National Statistical Department reported an average daily bread intake of 226 grams; in January 1956 only 203 grams. During that time, the proportion of *white* bread consumed rose from 15·9% to 18·6%,[28] and the intake of B_1 decreased correspondingly. Therefore the average daily intake for adults of B_1 was given as only 1·0-0·9 mg. in the "normal years" of 1935-38 and 1951-52.[23] The results of practically all the new surveys relating to the vitamin B_1 content of the German diet lead to the

conclusion that current diets do not cover the vitamin B_1 requirement.[6,7,17,19,22,23,27,29,30,31,32,33]

Many reports on vitamin B_1 deficiencies from other countries show that Germany is not alone:[9,11,24,25,34,35] for instance, in the United States in 1940, the average daily supply of B_1 was only 1·7 mg.[10] The frequent demand for an urgent improvement in the supply of vitamin B_1 is well founded.

Vitamin B_2. The requirement of vitamin B_2 is given as between 1·5 and 5 mg. per day;[4,7,22,23] however, a daily intake of 1·8 mg. seems to be sufficient.[5] For the German population, the supply of B_2 is comparable with the supply of B_1: since the middle of the 19th century, the vitamin B_2 content of the average German diet has decreased from 7 mg. per day to 3 mg. per day;[23] with current diets, the daily intake of vitamin B_2 might be substantially lower. Severe avitaminosis has not been observed, but the average daily intake is not the optimum; it is marginal, and therefore dangerously inadequate for proper nutrition. A similar situation holds true amongst the peoples of other countries, where eating habits and changes in the choice of foods have led to deficiencies in B_2 (see references on vitamin B_1).

However the importance of milk as a source of vitamin B_2 must not be overlooked. If the consumption of milk is high avitaminosis B_2 will not appear.

Nicotinic acid. The requirement of nicotinic acid is given as between 8 and 20 mg. per day.[7,22,23] For a good supply of nicotinic acid, a daily intake of 12-15 mg. should be sufficient.[1] The nicotinic acid requirement in Germany is also inadequately covered in the current common diets.[17,19,22] Although an average daily intake of 18 mg. of nicotinic acid was usual during the middle of the 19th century, the average intake in 1951 was only 9 mg. per day.[23] During the war the average daily intake was given as between 5-10 mg. or only 36%-73% of the requirement.[7] Severe avitaminosis, as was seen in Spain during the Civil War (there were 30,000 cases of pellagra in Madrid alone)[36] has not been observed in Germany. However, a vitamin intake which is marginal to—and at times even considerably lower than—the requirement, is always serious. Under such circumstances symptoms of deficiency do not immediately appear, but are sure to appear in time.[6] Insufficient nicotinic acid in the average diets of other countries is also often reported.[9,11,24] In the United States, as late as 1940, 2,133 deaths were diagnosed from pellagra.[10]

Other B-vitamins. The requirements for the other B-vitamins, particularly pyridoxine, pantothenic acid and vitamin B_{12}, are not yet exactly known. The requirement for pyridoxine probably lies between 2 and 4 mg. per day; for pantothenic acid, between 5 and 20 mg., and for vitamin B_{12}, about 0·001 mg.[15,37] Similarly, there have been no extensive surveys on larger groups of people to discover the deficiency-symptoms of these vitamins; nor are any instances of large-scale supplementation known, though several recent papers have reported the favourable effects of supplements of pyridoxine,[38,39,40,41] pantothenic acid[10] and vitamin B_{12}[42,43] to diets. However, the need for the general supplementation of foods with these vitamins cannot be established from these results alone.

Up to the present, only pyridoxine amongst the other B-vitamins has received any serious consideration as an additive to food.

MINERALS

1. Calcium

Requirement: 0·2 - 0·8 gm. daily.[14,45,46,47] These amounts of calcium are, however, to be considered as minimal. The suggested requirement of 0·2 gm. per day[44] is certainly too low, though based on "balanced experiments"; "balanced experiments," intended to discover the optimum requirement of calcium, are, on the whole, of questionable worth.[46,48] A margin of safety is necessary to cover the additional requirements of "overactivity," and this results in the preferred daily calcium intake of 1 gram.[4,5] The requirement is doubled during pregnancy and lactation; and an adequate calcium intake is equally important for children and the aged. The relationship between calcium and phosphorus is also of importance: the calcium : phosphorus ratio should be from 1 : 1 to 1 : 2.

The German people's average intake of calcium was particularly inadequate during and after the war; between 0·12 and 0·38 gm. per day,[7,47] it was only 12% to 38% of the recommended level. This was also true of the diets of the Armed Forces.[49] Improvements in the food supply brought improvement in the calcium supply as milk, cheese, and green vegetables—all rich in calcium—became plentiful. However, one still cannot speak of a *good* calcium supply because the average intake does not reach the desired optimum.[45,47,50] An improvement in the calcium intake is desirable because calcium deficiency leads not only to a mineral depletion of the skeleton, but also to retarded growth, higher susceptibility towards infection, nervousness, diminution of potency, and finally to a shorter expectation of life.[45] A similar need of an increased calcium supply has been reported from other countries.[9,10,51,52,53]

2. Iron

It is difficult to give exact requirements for iron. 12 mg. per day have been recommended.[4,52,54] The requirement rises to 15 mg. for children, and for pregnant women.[5] Iron belongs to the group of "trace-elements," and it plays an important part in hematopoiesis. Iron-deficiencies are widespread in current diets, particularly in those of the lower income groups; and, on the whole, the desired minimal amount is not reached. This manifests itself by frequent appearances of anaemia:[51] for example, the percentage of sideropenic anaemia amongst the people of

the United States was in 1939 between 1%-85% for children (including regional differences); between 1%-30% for males; and up to 68% for females.[10] The demand for an increased iron intake has been made in many countries.[10,24,53]

3. Iodine

Like iron, iodine belongs to the "trace-element" group. Daily amounts of 0·15 to 0·30 mg. are sufficient to cover the iodine requirement of adults.[10,55] These small amounts are normally taken in drinking water and in food.

In areas where the soil and water have a poor iodine content, a great number of people suffer from goitre, a disease characteristic of iodine deficiency which is caused by hypofunction of the thyroid gland. This functional disturbance can have far-reaching effects on the entire body; the inevitable result is a retardation of both mental and physical development.[55]

In 1949, the "Expert Committee on Nutrition" of the World Health Organisation (FAO/WHO) found an alarming number of cases of endemic goitre prevalent in many countries.[56] A justifiable demand for a general increase in the supply of iodine in food follows from this, particularly in such areas where the iodine-content of drinking water is insufficient.[10,56,57]

4. Fluorine

Under normal conditions, it is not known whether fluorine is necessary in the formation of bones and teeth. Taken in certain minimum amounts, it undoubtedly increases resistance to chemical irritants by the development of resistant fluorineapatite in teeth; but it is too early to determine a fixed requirement for fluorine.

The possibility of prophylaxis against caries by an increase in the fluorine intake—as already demonstrated in the United States—has led to a demand, in many countries, for an increase in fluorine-intake in food.[58,59]

PROTEINS

A certain proportion of food must be taken in the form of protein, and this cannot be replaced either by fats or by carbohydrates; the desirable daily amount of protein is 1 gm. per kg. of body weight,[37] which corresponds to an average daily intake of 70 gm.[4] At least 40% of this intake should be in the form of animal protein. A higher percentage of animal protein intake is desirable for intensive mental exertion, for children and for the aged.[5] Strenuous physical exertion, convalescence, pregnancy and lactation also call for an increase over the normal protein intake.[5] The biological value of a protein is closely associated with its content of the essential amino acids. These essential protein elements must, of necessity, be consumed in food; though they are urgently needed by the human organism; it cannot synthesise them itself. All of these essential amino acids must, in certain minimum amounts and in certain proportions, be taken in food; an insufficient supply of any one of them leads to characteristic deficiency symptoms.[60] It is understandable therefore that protein-deficiency symptoms can have various origins: the cause may lie in a generally inadequate supply of protein; or, even when the supply of protein is adequate, deficiency symptoms may appear because of poor protein quality—such as a specific deficiency in only one of the essential amino acids. The inadequate supply of protein, or deficiencies of high-value protein, is an international problem of concern to many countries in the Far East, Africa, North and South America, as well as in Europe.[61] The worst years of gross deficiency are past in Germany, but during the war the daily average intake was only 33-50 gm., or 51%-77% of the recommended level.[7] However, new surveys covering the provision of protein have disclosed that, even today, a considerable proportion of the population—according to 1951 reports, 8·3 millions in the German Federal Republic—are suffering from protein deficiency.[62] The average daily protein intake of this section of the population is given as 57 gm., of which only 12 gm. is in the form of high-value animal protein. Household surveys taken in Berlin in 1950 disclosed an average protein intake of 63 gm. daily, which consisted of 28 gm. of animal protein and 35 gm. of vegetable protein.[63,64] Usually, the minimum requirement is reached with this intake, but a protein intake which is on the borderline of requirement can cause serious pathological deficiencies and should be avoided: for example, a reduction in the activity of many enzymes is particularly to be feared because it results in disturbances of intermediary metabolism.[60] The need for an improvement in the provision of protein follows from this fact alone. The intake of protein, large enough in quantity and in proper balance is the absolute prerequisite for the efficient performance of all the vital functions.[60]

REFERENCES

1. A. Scheunert. Über die Vitaminisierung von Lebensmitteln. *Die Lebensmittelindustrie*, 1951, **3**, 208.
2. S. H. Rubin and E. de Ritter. Vitamin A requirements of animal species. *Vitamins and Hormones*, 1954, **12**, 102.
3. Nutrition in wartime. Human requirements of vitamin A and C. Medical Res. in War Report of the Med. Res. Council for the years 1939-45. The Work of the Accessory Food Factors Committee, London. His Majesty's Stationery Office. 1946.
4. Recommended Dietary Allowances. National Res. Council Reprint and Circular Series, October, 1948, No. 129.
5. Die wünschenswerte Höhe der Nahrungszufuhr. Empfehlungen des Ausschusses für Nahrungsbedarf der deutschen Gesellschaft für Ernährung I.Mitt., Umschau, Verlag, Frankfurt/M., 1956.
6. W. Stepp. Ernährungsphysiologische und ernährungspathologische Probleme unter besonderer Berücksichtigung der Vitamine. *Pharmazie*, 1952, **7**, 70.
7. A. Scheunert. Ernährungsprobleme der Genenwart. S.-B. d. Dtsch. Akad. Wiss. Berlin, Kl. landwirtsch. Wiss, 1952, **1**, 1.
8. W. Becker and G. Karber. Soll die Margarine fur Berlin vitaminiert werden? *Berliner Gesundheitsblatt*, 1952, **3**, Heft 15, S. 1.

9. J. D. Adamson, N. Joliffe, H. D. Kruse, O. H. Lowry, P. E. Moore, B. S. Platt, W. H. Sebrell, J. W. Tice, F. F. Tisdall, R. M. Wilder and P. C. Zamecnik. Medical survey of nutrition in Newfoundland. *The Canadian Medical Ass.*, 1945, J.52, 227.
10. J. Dufrénoy and L. Genevois. Der Zusatz von Vitaminen und Mineralsalzen zu Nährmitteln in den U.S.A., eine Massnahme zur Verbesserung der nationalen Ernährungswirtschaft. *Ernährung*, **1**, 1949, 5-11 and 28-33.
11. W. H. Sebrell, Jr. Vitamins and public health. *Int. Z. Vitaminforschg.*, 1952, **23**, 380.
12. A. Høygaard. Nachtblindheit als Folge von Mangel an A-Vitamin. *Klin. Wochschrft.*, 1940, **19**, 1139.
13. H. Aebi. Der Bedarf an D-Vitaminen und deren Wirkungsweise. Manuskript (unpublished lecture, Bern, 1956).
14. Food processing and nutritional values. *Nutrit. Rev.*, 1949, **7**, 284.
15. Vitamin Vademecum. Deutzche Hoffmann-LaRoche A.G., Grenzach/Baden, 1952.
16. K. Lang and O. F. Ranke. Stoffwechsel und Ernährung. Springer-verlag, Heidelberg, 1950.
17. A. Scheunert. Gedanken zur Mehl- and Brotfrage. *Brot and Gebäck*, **10**, No. 2, 1956.
18. K. H Wagner. Die Vitaminisierung der Sterilmilch. *Milchwissenschaft* 7, 1952, 250.
19. K. H. Wagner. Die Strukturwandlung der deutschen Volksernährung in den Jahren 1935 bis 1952. *Fette, Seifen*, 1954, **56**, 303.
20. A. Gasnier, M. B. Loranger and L. Brouha. L'alimentation des ouvriers Canadian-Français d'une usine de l'Aluminium Company of Canada. *Rev. Canad. de Biol.*, 1953, **12**, 355.
21. J. Schormüller. Die Brotfrage und ihre Bedeutung für die Versorgung der Bevölkerung mit Vit. B_1. *Dt. Gesundheitswesen*, 1947, **2**, 641.
22. B. Thomas. Ist die Deckung des Bedarfs an Brotvitaminen gewährleistet? In Ernährungsforschung, Vol. I, No. 1 (Akademie-Verlag, Berlin, 1956).
23. K. H. Wagner. Untersuchungen über den Vit.-B_2- und Nikotinsäuregehalt der deutschen Kost 1935-52 and 1951-52). Parts I and II. *Fette, Seifen*, 1955, **57**, 721 and 932.
24. W. C. Aalsmeer, K. Mitra, I. A. Simpson and N. Obando. Rice enrichment in the Philippines. Food and Agricult. Org. of the United Nations. FAO Nutritional Studies No. 12, Rome, Italy, March, 1954.
25. H. B. Burch, J. Salcedo, Jr., E. O. Carrasco, C. L. Intengan and A. B. Caldwell. Nutrition survey and tests in Bataan, Philippines. *J. Nutrit.*, 1950, **42**, 9.
26. W. Droese. Experimentelle Untersuchungen über die Vitamin B_1-Versorgung der grossstädtischen Bevölkerung in den Jahren 1941-42 und 1943. *Arbeitsphysiologie*, 1943, **13**, 62.
27. A. Scheunert. Die Vitamin-B-Bilanz unserer heutigen Ernährung unter besonderer Berücksichtigung der Vitaminisierung der Mehle. *Getr., Mehl Brot*, 1950, **4**, 117.
28. Informationen/Brotgetreide - Erzeugnisse. Herausgeber: Presseabteilung der Marktforschungsstelle Getreideerzeugnisse in der Mühlenstelle. Bonn, 1956 (Nr. 1-9).
29. K. Lang. Fortschritte in der Ernährungswissenschaft. *Regensburger Jahrbuch f. ärztl. Fortbildung*, 1953, **3**, 1.
30. A. Prüfert. Die Entwicklung des Brotverbrauchs in den letzten Jahren. *Brot und Gebäck*, 1953, **7**, 189.
31. A. Ronge and W. Becker. Erhebung über die Ernährungsverhältnisse in 25 Westberliner Haushalten mit Kindern 1951/52. *Landwirtschaft-Angewandte Wissenschaft*, Nr. 19 (Bundesministerium f. Ernährung, Landwirtschaft und Forsten).
32. H. Scheunert. Wandlungen der Volksernährung während des letzten Jahrhunderts. 1954. (Akademie-Verlag, Berlin.)
33. K. H. Wagner. 1st die Vitamin-B_1-Versorgung durch unsere tägliche Kost gesichert? *Die Müllerei*, 1953, **6**, 17 and 34.
34. A. Jung. Das Brot als Volksnahrungsmittel, in "Das Buch vom Schweizer Brot," Vierwachten-Verlag, Zürich, 1953.
35. Weissmehlvitaminierung in Dänemark. Schlussfolgerungen des Getreideausschusses der dänischen Akademie für technische Wissenschaften. Beretning II fra Kornudvalget, Kopenhagen, 1950.
36. W. Stepp. Der Magendarmkanal in seiner Bedeutung für den Vitaminhaushalt. *Med. Monatsschrift*, 1956, **10**, 213.
37. "Vitamine." Fa. E. Merck, Darmstadt, 1955.
38. U. D. Register, U. J. Lewis, W. R. Ruegamer and C. A. Elvehjem. Studies on the nutritional adequacy of army combat rations. *J. Nutrit.*, 1950, **40**, 281.
39. M. B. Richards. Influence of the extraction rate of flour on conditioned pyridoxin deficiency in rats. *Brit. J. Nutrit.*, 1949, **3**, 132.
40. B. D. Westerman and G. Hall. Improving the nutritive value of flour. 1. Effect of supplementing enriched flour with other B-complex vitamins. *J. Nutrit.*, 1947, **33**, 301.
41. B. D. Westerman and D. R. Templeton. Improving the nutritive value of flour. II. Effect of supplementing enriched flour with B-complex vitamins and some observations on the use of 80% extraction flour. *J. Nutrit*, 1948, **36**, 187.
42. B. Sure. Improvement in protein efficiency as a whole wheat cereal breakfast food with the amino acids lysine and threonine and vitamin B_{12}. *Arch. of Pediatr.*, 1952, **69**, 359.
43. B. Sure. Improving the nutritive value of cereal grains. 1. Improvement in the efficiency of the proteins in milled wheat flour with lysine, valine, threonine and an extract from condensed fish solubles. *J. Nutrit.*, 1953, **50**, 235.
44. D. M. Hegstedt, I. Moscoso and C. Collazos. A study of the minimum calcium requirements of adult men. *J. Nutrit.*, 1952, **46**, 181.
45. F. Holtz. Kalkmangel in der Nahrung. *Ernährung und Verpfl.*, 1949, **1**, 48.
46. H. Kraut and H. Wecker. Kalkbilanz and Kalkedarf. II, Mitteilung *Biochem. Z.*, 1948, **318**, 495.
47. A. Scheunert. Die physiologischen Grundlagen der Calciumversorgung. *Ernährung and Verpflegung*, 1949, **1**, 46.
48. O. Högl. Vergliechende Betrachtung der Schädlichkeit von Lebensmittelkomponenten. *Mitt. Lebm. Unters. Hyg.*, 1953, **44**, 484.
49. K. Lang and E. Schütte. Sitzungsbericht der 9. Arbeitstagung der "Arbeitsgemeinschaft Ernährung der Wehrmacht."
50. K. Täufel. Calcium als Bestandteil der Nahrung. *Dt. Lebm. Rdsch.*, 1949, **45**, 9.
51. J. Morau and J. B. Hutchinson. Calcium in the Nutrition of Adults. *Chemistry and Industry*, 1942, S. 416/70.
52. H. C. Sherman. Calcium in the Chemistry of Foods and Foodstuffs. *Nutrit. Rev.*, 1952, **10**, 97.
53. Zusätze zu Weizenmehl und Weizengriess. Erlass Nr. 349 über die Zugabe von Vitaminen und Mineralstoffen zu Weizenmehl undgriess vom 30 Dez. 1953. *Lovtidende A.*, Nr. XLXII, 1954, v. 7, 1, S. 1429 (Dänemark); ref. FAO, 1954, Vol. III, No. 1.
54. H. D. Cremer. Mineralien als Nahrungsbestandteile, in Gegenwartsprobleme der Ernährungsforschung. Symposium/Basel, Zus. fassung bei Verlag Birkhäuser, Basel-Stuttgart, 1953.
55. H. D. Cremer. Die anorganischen Bestandteile unserer Nahrung und ihre Wertigkeit. Unpublished lecture.
56. Joint FAO/WHO. Expert Committee on Nutrition. Report on the fourth session. Food and Agricult. Organisation of the United Nations. Technical Report Series No. 97, Rome, Italy, July, 1955.
57. H. Cauer. Schwankungen der Jodmenge in Mitteleuropa, deren Ursache und deren Bedeutung für den Jodgehalt unserer Nahrung. *Ernährung*, 1941, **6**, 248.
58. H. J. Schmidt. Zusammenfassung verschiedener Vorschläge zur Bestimmung der notwendigen zusätzlichen Fluoraufnahme mit der täglichen Nahrung. Int. Fluor-Kommission, Team II: Dosierungsteam, 1956.
59. H. J. Wespi. Fluoridiertes Kochsalz zur Cariesprophylaxe. *Schweiz. med. Wochschrft.*, 1950, **80**, 561.
60. K. Lang and H. D. Cremer. Die Bedeutung von Eiweiss und Fett für die Ernährung des Menschen. *Z. f. Lebm. Unters und Forschg.*, 1948, **88**, 633.
61. N. W. Flodin. Amino acids and proteins. Their place in human nutrition problems. *Agricult. and Food Chem.*, 1953, **1**, 222.
62. H. Kraut, K. Lang, W. Lintzel, W. Diemair, P. Pelshenke u.a.m. Der Eiweissmangel in der Ernährung eines grossen Teiles der Bevölkerung der Bundesrepublik und die Möglichkeiten der Anreicherung des Brotes mit Eiweiss zur Verbesserung der Volksernährung. *Denkschrift*, March, 1951.

63. A. Ronge. Erhebungen über Ernährungsverhältnisse in der Westberliner Bevölkerung. *Gesundheitsfürsorge*, 1952, **2**, 2.
64. A. Ronge. Die Eiweissversorgung in Westberliner Haushalten. *Berliner Gesundheitsblatt*, 1952, **3**, Heft 10, S 1.

Success with Meat Products

(*Concluded from page 285*)

available for gas, oil, electricity, or solid fuel heating. A range of general purpose ovens is also available in single or double deck units. A feature of these ovens is that they can be dismantled into composite sections for transportation and quickly and easily reassembled. Box section stands are supplied to raise the ovens to a convenient working height, and cupboards and provers can be built into the stands at the time of manufacture.

Refrigeration

A range of refrigerated equipment for the meat trade is made by the Pressed Steel Company, Ltd. Their *Prestcold* equipment includes a useful two-in-one cold room which has one compartment of 550 cu. ft. capacity at 15°F. for the storage of frozen meat and one of 580 cu. ft. capacity at 37°F. for general storage. Coldrooms for the bulk storage of meat poultry, bacon, etc., are available in a wide range of sizes from 50 cu. ft. upwards. All temperature ranges required for meat products can be provided and correct temperature is maintained by automatic control.

Prestcold also provide a wide range of refrigerators and refrigerated sales cases suitable for the storage and display of meat products.

▶Lenderink and Co. N.V., of Schiedam, Holland, have published the 9th edition of their booklet on *Hyfoama*. This is described as a whipping agent prepared from pure casein by controlled hydrolysis. The makers recommend its use in a wide variety of articles to aerate and modify the texture. The booklet contains a large variety of recipes which should prove to be of interest to the confectioner.

Polyphosphates

(*Concluded from page 289*)

limits to the proportions of fat, as we recommend, we do not consider it necessary to ban their use." In point of fact, the Minister of Food has not implemented the recommendations of this Report and no standards of composition for sausages exist. It is clear, however, that the Food Standards Committee sees no objection to the legitimate use of phosphates. Their concern for the protection of the consumer is at least partly covered by the fact that phosphates will not compensate for deficiencies in quality due to the use of inferior raw materials. In fact, the polyphosphate position may almost be summarised by saying that they may make a good product better, but they cannot make a bad product good.

REFERENCES
1. Möhler and Kiermeier. *Z. Lebens. Forsch.*, 1957, **105**, 265.
2. Henrickson, Sleeth and Brady. *Food Tech.*, 1956, **10**, 500.
3. Anon., *Nat. Provis.*, 1955, **133**, No. 9, 24.
4. Bendall. *J. Sci. Food Agric.*, 1954, **5**, 468.
5. Körmendy. *Élelmez. Ipar. Budapest*, 1956, **10**, 7 (*Food Science Abstracts*, 1957, **29**, 21).
6. Swift and Ellis. *Food Tech.*, 1956, **10**, 546.
7. Swift and Ellis. *Food Tech.*, 1957, **11**, 450.
8. Henry, Billon and Haouza. *Rev. Path. Gén. et Comp.*, 1955, No. 669, 857.
9. Hamm. *Fleischwirtschaft*, 1955, **7**, 196.
10. Arnold, Wierbicki and Deatherage. *Food Tech.*, 1956, **10**, 245.

▶*The Right Way to Package Biscuits* is the title of a booklet published by British Cellophane, Ltd. The booklet emphasises that good packaging is just as essential as quality, price and an effective brand name. The properties of *MXXT* 400/35, a new type of Cellophane, are described and a range of packs which combine product protection with sales appeal is illustrated.

▶The Cambridge Instrument Co., Ltd., have published a booklet giving information on their thermographs and index thermometers. These have mercury-in-steel systems and are intended for use in the temperature range from −20° to 1,000°F. or −30° to 600°C. These instruments are designed to give high accuracy and long life under industrial conditions. Models are available for all classes of work appropriate to mercury-in-steel systems.

A Comprehensive Approach to Food Problems

THIS unassuming work*—a treatise rather than a book, a thesis rather than a commercial venture—has been deservedly sponsored by the International Committee of Agricultural Industries. Deservedly because it has been written by a leading French expert, *viz.* the Director of Research of the French School for Agricultural and Food Industries, who has an important point to make.

Having first reviewed the enormous technical progress in the various branches of these industries in modern times, the author insists that, because of their common biological purpose, these industries should be regarded as a single entity rather than as a group of different industries working more or less in isolation from each other. He emphasises this point by an excursion into certain scientific and technological aspects common to these industries, and pleads for much closer collaboration between them in such matters as dissemination of knowledge, research, documentation, technology, etc.

Though all the constituent branches of the food industry would of course retain their independence, they also stand to gain much from the mutual acknowledgement of a certain measure of "interdependence," as advocated by the author of this book.

A thesis of this kind is of course inherently controversial and is likely to call forth a good deal of criticism, especially from those who may doubt the practical value of closer integration between industrial branches which, in some cases, have widely divergent interests. But in spite of (or is it "because of"?) this controversial aspect, the book is stimulating to read and will be welcomed by those who prefer to take the bird's eye view of problems.

E. ROCKWELL

* *Unité Progrès Technique et Productivité dans les Industries Agricoles et Alimentaires*. By R. Bousser. Commission Internationale des Industries Agricoles, Paris. Pp. 124.

Advances in Food Technology

MEAT PRODUCTS

Bacterial Action in Raw Sausage

As a rule, the bacterial flora quantitatively predominating in dry sausages is that of the Lactobacteriaceæ. Faulty as well as unobjectionable dry sausages often show the same species of Lactobacillus or Streptococcus. There is good reason to assume that certain species or strains of these genera are able to influence the development of colour and flavour in dry sausage, either directly through destruction of the muscle pigment, or through nitrate and nitrite reduction, or indirectly through affecting the acidification process. According to investigations carried out on numerous defective dry sausages, it is highly probable that most discolorations in dry sausages are caused by Lactobacilli. Such discolorations are favoured by excessive sugar content and high ripening temperatures in conjunction with inadequate drying and smoking.—K. Coretti, *Die Fleischwirtschaft*, 1958, **10**, 218.

POULTRY

Penicillin-Fed Chickens

The German Federal Meat Institute at Kulmbach has carried out experiments with the admixture of penicillin to chicken feed. It was found that, under otherwise equal conditions, the live and dead weights of the pencillin-fed chickens were higher, and that their meat was more juicy and tender and showed a better flavour. The breast muscles of penicillin-fed chickens showed a better water-binding capacity. But, with the exception of the leg muscles which were richer in fat, there was no significant difference in the chemical composition of the muscles. The *p*H value was generally lower by 0·2 units with penicillin-fed animals.—R. Grau and H. Reuter, *Die Fleischwirtschaft*, 1958, **10**, 255.

BAKERY PRODUCTS

Use of the Chopin Alveograph

It has not been possible, so far, to establish a sufficiently reliable correlation between the baking value of flour obtained with the Chopin alveograph and the loaf volume of the bread. In the experience of the Cereals Division of the Dutch Food Research Institute, Wageningen, the uncertainty of predicting the loaf volume from flour samples is of the order of 750 to 1,000 millilitres per kilogram of flour. Better results can be obtained in respect of the mean value of a series of samples.—A. H. Bloksma, *Industries Alimentaires et Agricoles*, 1957, **74**, 653.

FREEZING

Poultry Frozen in Air

Studies have been carried out by the National Research Council in Ottawa into the freezing rate and the appearance of eviscerated poultry frozen in air. For the experiments use was made of a small wind tunnel located in a cold room which could be held at the required temperature. A somewhat larger tunnel was used to freeze birds in cardboard boxes. The birds (or boxes) were placed on a coarse wire screen to allow air movement over all surfaces.

Tests were made with white-skinned grade A birds scalded at 128°F.-130°F., eviscerated and vacuum packed (Cry-O-Vac). Air temperatures varied between +10°F. and −110°F. and air velocities between 0 and 1,900 f.p.m.

It was concluded that over the range tested air velocity had almost as much effect as temperature on freezing time and appearance. Freezing times decreased and the surfaces of the birds became more uniform and lighter as the air velocity rose from 0 to 600-800 f.p.m. Changes were slower up to 1200-1500 f.p.m. and almost negligible thereafter.

Surface appearance depended directly upon the time taken to freeze the skin. Bird size did not effect the time taken to freeze the skin, but only affected the total freezing time.

Boxing of birds prior to freezing resulted in darker non-uniform appearances and longer freezing times. The appearances were more uniform and lighter as the ventilation increased. Suitable ventilating and spacing resulted in products approaching the appearance of birds frozen on open shelves. It was found that the effect of decreasing the air temperature was similar to that of increasing the air velocity. Freezing time and surface appearance were marked down to −40°F. but only slight after −60°F.—L. van den Bergh and C. P. Lentz, *Food Technol.*, 1958, **12** (4), 183.

ANALYSIS

Determination of Copper in Gelatine

Some newer methods for the determination of traces of copper have been applied to gelatin and the results compared with those obtained with the procedures in common use.

It was concluded from the studies that 2:2′-Dioquinolyl and neocuproine are equivalent in most respects except for the stability of the reagent. The stabilities of the complexes to light favour these reagents, simplicity, sensitivity and economy favour biscyclohexanone oxalydihydrazone. All these reagents have advantages over sodium diethyldithiocarbamate. The polarographic method is described as being simple and convenient, although not generally so attractive as a colorimetric method.—G. Russell and P. J. Hart, *The Analyst*, 1958, **83**, 202.

Machinery and Equipment

DRUM STORAGE UNITS

Steel drums may be stacked up to five tiers high by using the Powell drum storage unit and a fork lift truck. Each drum is securely cradled and the forks are always safely positioned under the load during stacking operations.

The units are of tubular steel and may be easily carried by one man. Each unit holds two drums and it is stated that no permanent fixtures are required to enable drums to be stored neatly and safely. The danger from slipping as in pyramid stacking is believed to be eliminated.

COKE-FIRED BOILER

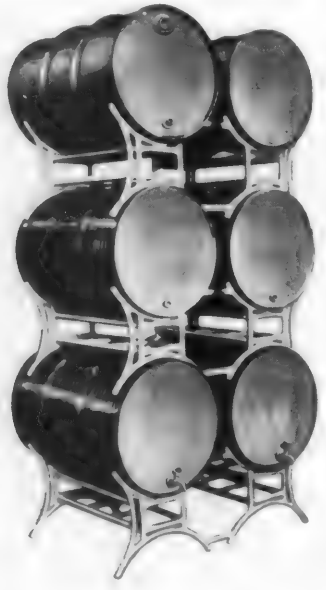
A coke-fired boiler which is already in wide-spread use on the Continent is being introduced to this country by Newton Chambers and Co., Ltd., who have entered into an agreement with the makers. It will be known here as the *Redfyre Emma*.

The boiler incorporates a secondary chamber which is in effect a gas producer as well as a boiler. Consequently it is claimed for the boiler that it has a thermal efficiency of 85-90%, which it is pointed out, is higher than that of the ordinary boiler.

Boilers installed on the Continent are stated to range from single units of 250,000 B.Th.U. an hr. to multiple units of 30 million B.Th.U. output an hr.

The boiler burns many varieties of coke including the large size which is said to be in more than ample supply from British gas undertakings. The coke for the boiler is stored in a large hopper and is fed by gravity into the fire zone through which primary air is passed horizontally. The gas produced passes into a combustion chamber into which preheated secondary air is admitted, ensuring complete combustion. From there the products of combustion pass through a heat exchanger on their way to the chimney.

It is stated that automatic temperature control operates within close limits and the boiler can be raised from low load to full load in a short time. The mechanical clinkering device is operated by a lever at the side of the furnace. It will operate for 8 hr. under full load conditions, for 18-20 hr. at half load and up to 48 hr. on low load conditions, without supervision. The boiler is compact, and can be sited at ground level, in a cellar or existing boiler houses.



These tubular steel units, made by Powell and Co., will each hold 2 drums.

WATER TREATMENT CONTROL

A testing kit has been produced by Albright and Wilson (Mfg.), Ltd., that enables control tests to be made easily and quickly on different types of water. The results obtained using this kit are said to be adequate for the great majority of water treatment control purposes, although slightly less accurate than those obtainable under controlled laboratory conditions.

The kit may be used for the control of water treatment for steam boilers, including those where phosphate conditioning is employed, as well as for checking water softener efficiency and testing water in re-circulated cooling water systems.

Raw and softened waters can be tested for total hardness, alkalinity to phenolphthalein and methyl orange, and chloride concentration. Boiler water tests include total and caustic alkalinity, chloride and phosphate concentrations.

Phosphate conditioning to prevent scale in boilers relies on the maintenance of an adequate caustic alkalinity and reserve of phosphate in the boiler water. With this new kit, boiler water testing can be carried out regularly and efficiently by boiler house personnel according to the makers.

The kit includes all necessary apparatus, together with polythene bottles containing reagents.

The Dallow Lambert patented Dustmaster sack-tipping unit.

SACK TIPPING UNIT

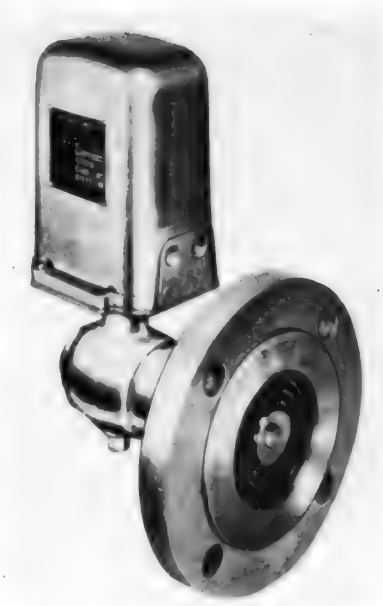
The problem of tipping sacks without causing a cloud of dust to arise has been tackled by Dallow Lambert and Co., Ltd., and the result is the *Dustmaster* sack tipping unit.

The unit is designed to be placed over a hopper or conveyor, or wherever it is needed. A fabric filter in the unit provides 100 sq. ft. of filtration area. A fan directly driven by a 2 h.p. motor induces a steady flow of air through the counter-balanced door as the operator tips a sack into the hopper below. Collective efficiency is stated to be almost 100% and the hinged door closes automatically as the sack is withdrawn.

The filter is periodically shaken to dislodge the accumulated dust which is returned to the system. The operation of the mechanism for carrying this out may be either manual or actuated by a fractional h.p. motor, controlled by an electronic timer set to work at predetermined intervals.

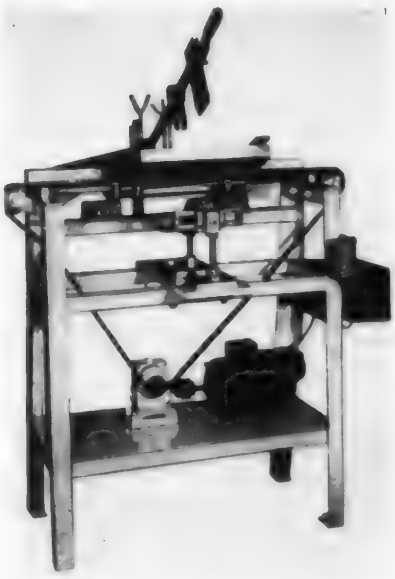
VACUUM VALVE

A new vacuum valve, the *Mancuna-Dustex*, has been developed by Mancuna Engineering, Ltd., for use with dust collector hoppers and bin discharges. The valve operates on a simple vacuum principle, the seal being maintained by negative pressure within the valve that collapses the specially formed flexible sleeve. The weight of collected material forces it through the sleeve at a constant rate



The type 13FA direct mounted liquid level transmitter made by Foxboro-Yoxall, Ltd.

The Mancuna-Dustex valve for use on dust collector hoppers and bin discharges.



The Dawson 3-Way screen process printing machine is easily adapted to print on almost any shape of object.

of flow. No power is required, as the valve functions automatically, and as there are no moving parts to wear out and cause leakage, no maintenance is necessary. Because of these advantages and the absolute seal provided, the makers believe that the valve will rapidly replace those of the mechanical type now in use.

The Neoprene sleeve of the valve is claimed to be resistant to most chemicals and to be capable of withstanding temperatures up to 350°F. Sleeves can be replaced quickly and easily if necessary.

LIQUID LEVEL TRANSMITTER

Foxboro-Yoxall, Ltd., have recently added a new instrument known as the Type 13FA to their range of pneumatic transmitters. It is a direct-mounted liquid level transmitter which uses the 13A force balance design to measure liquid level in open or closed vessels. It transmits an output air signal to standard 3-15 p.s.i. receiver recorders and controllers which may be locally or remotely mounted. The sensing diaphragm is flange mounted to the side of the tank. The 13FA is thus said to be particularly suited for the measurement of difficult fluids of the viscous and slurry types.

The instrument operates on open or closed vessel applications. In open vessel measurement only the high pressure side of the pressure measuring diaphragm and the raised serrated face of the cell flange are in contact with the process fluid. The low pressure side of the diaphragm is vented to atmosphere. For closed vessel measurement only an equalising leg is required. If a "wet leg" is used an adjustable range suppressor attachment is employed to give forward reading measurment and to correct for "cold leg" conditions.

The instrument may be used under the most arduous corrosion conditions and to this end is supplied in three different forms.

The twin-diaphragm measuring element, liquid filled and with a solid stainless steel core, is completely protected against accidental overrange. It covers the full range of the instrument —0-20 to 0-850 in. of water. The range may be changed by moving a wheel up or down a rod fitted with a calibrated range scale. The instrument is suitable for use on pressures up to the rating A.S.A. 300 at 350° maximum vessel temperature.

SILK SCREEN PRINTING MACHINE

The new *3-Way* machine made by Dawson Bros., Ltd., is claimed to be the only silkscreen printing machine which will print three different ways in one unit. It is able to print on round or tapered objects such as bottles, etc., square tins and boxes and flat surfaces such as showcards. In round printing the screen moves backwards and forwards over the objects being printed while the squeegee remains stationary lightly touching the screen. In the other ways the squeegee moves backwards and forwards, pressing lightly on the stationary screen. The mechanical arrangement providing this motion is protected by British and foreign patents.

Adjustment from one process to another does not take long, and it is pointed out that single or multi colours can be printed on almost any kind of material.

The silk screen can be either stencil cut or photographically prepared; both methods are stated to give good reproduction.

EVAPORATOR

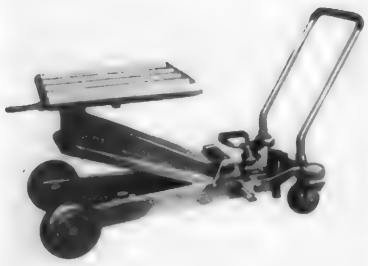
A 1 in. *Standard Climbing Film Evaporator* which can be used as a production unit, pilot plant, or as a demonstration model for instructional purposes was recently demonstrated by Q.V.F., Ltd. It is constructed in borosilicate glass which it is believed remains unaffected by practically all chemicals.

The makers point out that the design, which has been developed over a number of years, has been used successfully on antibiotics, fruit juices, milk, and a wide range of synthetic organic chemicals.

JAR WASHER AND DRYER

A machine of rotary design for washing and drying 60 confectionery jars per hr. has been produced by Dawson Bros., Ltd. Although the machine is intended primarily for the small producer, it may also be used as a supplement to existing machinery by the larger producer. The machine requires only 22 sq. ft. of floor space.

Jars are placed neck downwards in the machine in individual cradles mounted on a rotary chain conveyor. The jars are first subjected to a detergent wash at 145-160°F. which is delivered through spray jets. Before the wash is recirculated through the tank it is filtered to remove any



The Hunter Universal Truck is seen here fitted with a roller table.

residue. This is done by means of filter baskets which may be removed from the outside of the machine for cleaning.

After the wash the jars are sprayed inside and out with fresh water at a temperature of 189-190°F. This both sterilises the jars and tempers them for the drying treatment which follows.

The drying section is heated by a flameless radiant gas burner which dries off all trace of the rinse water, the jars emerging ready for use.

FACTORY MAINTENANCE TROLLEY

A hydraulic truck with interchangeable top platforms is being made by G. Hunter (London), Ltd. The truck is available in 3 capacities: 550 lb., ¼ ton and 1 ton. Standard models have an effective lift of 27½ in., a lowered height of 8¾ in., and a width of 19½ in.

The low-built chassis is fitted with 2 fixed wheels and 2 swivel castors. The hydraulic system is operated with a pivoting foot lever that may be operated from either side of the truck. The self-locking release valve may also be operated from either side of the truck and gives a controlled lowering speed.

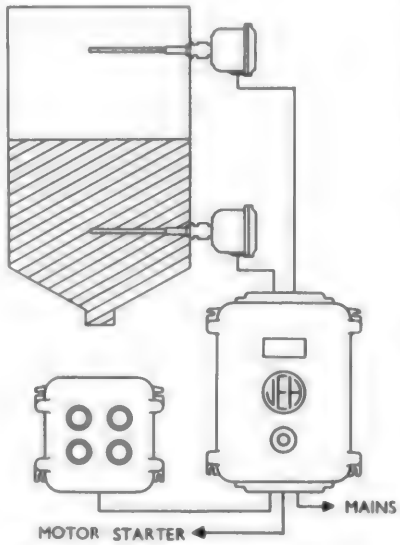
In the standard type lift truck, the lift platform may be swivelled through 360° and moved laterally a maximum of 6 in. to either side on a swing arm. It may be locked in a straight position. Extensions for higher lifts are available.

REMOTE LEVEL CONTROLLER

A capacitance type of level controller which can be operated at a distance of 3,000 ft. is now being produced by J. Edward Hall (Elec. Engineers), Ltd. Known as the *Proxicon Mark III*, it is intended for controlling the level of any liquid or free-flowing solid without necessitating direct contact with the material.

The instrument, which has no direct moving parts in the container, has tapped electrode terminals which can be extended to 3,000 ft. using standard types of cable. The makers say that the incorporation of heavy duty contactor-type double-pole changeover relay with *Elkonite*-faced contacts gives a longer contact life and greater flexibility in action. A trigger circuit gives snap action even with slow capacitance change. A separate signal-station unit has eliminated the overheating problem and allows unrestricted siting.

Sensitivities of greater than 1·0 pf can be achieved subject to variations of not more than ±0·25 pf with mains variations of +5 to −7½% and not more than ±1 pf with a temperature variation of ±20°F. from a 68°F. datum figure.



Industrial remote level controller for dual level applications. It is made by J. Edward Hall (Elec. Eng.), Ltd.

Consistency of operation from one instrument to another is guaranteed. The instrument can be supplied for single and dual level applications, voltage ranges 100-125, 200-250 and 360-450 v., cycle range 40-60. Three voltage tappings are incorporated for each range to enable exact site voltage to be selected.

HEAT EXCHANGER

A heat exchanger designed for cooking, cooling, drying, or heating fruit and vegetables has been introduced by George Scott and Son (London), Ltd. It is called the Scott-Rietz *Thermascrew* (*TJ 8*) and it consists of a hollow screw mounted on a hollow shaft rotating at slow speeds in a jacketed trough or pipe. The heating or cooling medium is circulated through the hollow portions, while the material passes through in contact with both jacketed trough and screw.

In batch operations, the unit functions as a jacketed kettle or ribbon mixer with a hollow single or double screw rotor, the construction of which is said to give a maximum heat transfer surface.

The *Thermascrew* may be fitted for vacuum drying and evaporating or with a supplementary area for dry heating or cooling. It is suitable for multipass operation and may be constructed of steel or stainless steel.

HANDLING AIDS

Several new appliances for mechanical handling have been introduced by Wessex Industries (Poole), Ltd.

The largest of these is the *Wessex* 10-ton electrically operated tractor which is of fairly compact size and is said to be very manœuvrable.

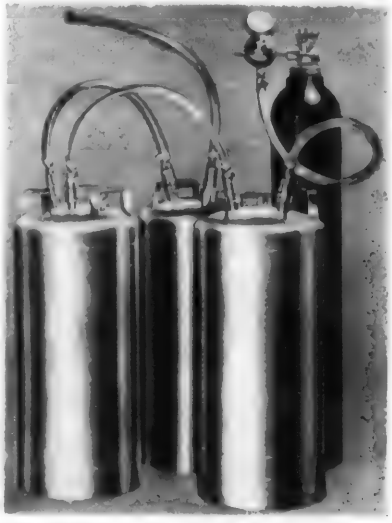
Two other machines made by the same firm, both of which can carry 30 cwt., are the heavy-duty reach truck and the general purpose truck. Both are electrically powered. The reach fork truck is suitable for carrying 48 in. pallets and has a tilting mast and a full free lift.

The firm also produces a small electric power unit, which has been fitted to a pedestrian-controlled, 10-cwt. pallet truck.

AUTOMATIC VENDING

Fisher and Ludlow, Ltd., have entered the vending field with stainless steel containers for pre-mixed drinks, syrups and similar commodities.

Pre-mixed drinks are stored in steel containers for use as dispensers behind the service counter or for automatic dispensing by coin. Their quality is thus controlled from the filling plant to the customer. The cylinders are connected by links to a CO_2 gas cylinder. The connections between the pre-mix containers are quick acting to enable rapid change from the empty containers to full ones without spilling.



These stainless steel containers together with the CO_2 gas cylinder are used for dispensing pre-mixed drinks. They are made by Fisher and Ludlow.

News Digest

New Extension to Patra House

Following the official opening of the new extension to Patra House by Sir Denis Truscott, T.D., Lord Mayor of London, on Wednesday, June 11, the printing and packaging laboratories were open to visitors. Open days were also held on June 12 and 13.

The new building, which occupies approximately 7,000 sq. ft., and has cost about £25,000, houses an extended package testing laboratory, and some of the latest techniques used in this service were on view. Equipment available in the new laboratory includes an inclined plane for producing side impacts, a compression tester to estimate the effects of stacking in a warehouse, a revolving drum in which a pack can be subjected to a sequence of drops, and vibration and drop testers. In addition, there are humidity rooms where packages can be stored under tropical conditions, and a shower and immersion booth.

In the packaging enquiry laboratory, examples of typical problems dealt with by the department were on show, and exhibits in the packaging research laboratory illustrated the work being done on journey hazards and the cutting and creasing of carton boards.

Packaging centre

Many famous firms are founder members of the Packaging Centre, due to open on July 1.

"We are particularly happy," says the director, Philip Andrew, "to have a membership which represents an excellent cross-section of the packaging world. At one end of the scale are several makers of collapsible tubes, providing the smallest of single-dose pharmaceutical packs, and at the other the makers of 50-gal. steel drums."

There are in Britain today, even at the highest levels, many who are not aware of the importance of efficient packaging. The Packaging Centre, offering an entirely new type of packaging information service, believes it can and will do much to put this right.

Cocoa Study Group meeting

The FAO Cocoa Study Group met recently in Hamburg. The Group studied the world cocoa situation and outlook.

It was reported that in 1957-58 the supply of cocoa beans had changed from relative abundance to shortage, largely due to adverse weather conditions in the major cocoa producing regions in Africa. As a result world cocoa prices were climbing again.

The Group discussed the report of the working party on stabilisation which it had set up at its previous session and which had met in London in March, 1958. All producing countries and a few consuming countries felt that there was a problem of marketing which justified international intervention. On the other hand, most of the major consumers were of the view that, while there were problems in the world cocoa economy, they arose to a large extent from inadequate production in post-war years in relation to expanded demand for cocoa products and that international marketing control was neither practicable nor in the long-term interest of producing and consuming countries.

It was decided, therefore, that no useful purpose would be served at this time by further discussion of the problem of stabilisation involving international control. It was, however, understood that any government participating in the Study Group could raise the matter at any future time if considered opportune.

Industry fights corrosion

The full "Proceedings" of the Corrosion Convention, held in London last October, is now available. Organised by *Corrosion Technology*, the Convention was attended by over 500 delegates from the U.K., Europe and America. 13 papers dealing with different aspects of the corrosion problem were delivered and discussed over two days, subjects covered including corrosion in the shipping, petroleum, atomic energy and chemical industries; metals, paints and plastics were discussed. Other subjects included packaging, water treatment, cathodic protection, fuel additives, hot galvanising and the protection of buried pipes.

The "Proceedings" contains over 100 pages, including full texts of all papers delivered, together with reports of the ensuing discussions. The volume is illustrated and costs 21s. post free, from *Corrosion Technology*, Leonard Hill House, 9, Eden Street, London, N.W.1.

Ulster bacon

The production of bacon in Northern Ireland increased to 58,600 tons in 1957 and represented almost 28% of that produced in the United Kingdom and approximately 11% of the total market supply, states the 1957 report of the Northern Ireland Pigs Marketing Board.

Purchases by the Board during the year reached the record figure of 1,190,948 pigs—an increase of 5% on the previous year.

This rise was absorbed by the Northern Ireland bacon factories whose increased capacity enabled them to handle upwards of 28,500 pigs per week during the period of peak supplies in September.

For the first year since the Board resumed trading operations it was not necessary for it to ship bacon pigs to Great Britain.

Sales of live pigs by the Board to Wiltshire curers and manufacturers averaged 18,750 pigs per week as against 16,800 per week in the previous year, representing a rise of over 11%. In contrast, sales of farm-killed carcases to roll and ham curers again declined by over 11% to an average of 4,100 pigs per week compared with 4,600 per week in 1956.

Fish freezing facilities

An Aberdeen group, headed by Byron S. Bellamy is sponsoring the laying down of quick freezing and cold storage capacity to hold 625 tons of fish. This scheme replaces an earlier plan for capacity in the region of 1,000/1,500 tons, which has been abandoned meantime because of difficulties of securing as much financial aid in Scotland as in England from the White Fish Authority. The scheme will provide Aberdeen with one of the most modern plants in the world and will allow Aberdeen to freeze and export to many overseas markets which are meantime buying Aberdeen fish.

Bulk delivery fleet

A new fleet of 1 and 5 ton lorries and vans is being used to extend fast bulk delivery of all *Oceco* and *Hypak* products made throughout the United Kingdom by the Oppenheimer Casing Co. (U.K.), Ltd.

A new "house styling" design for the firm's transport has been applied. The design, on a background of Empire Green, depicts a sausage and bag representing sausage casings and protective polythene packaging.

OBITER DICTA

● Cows affected by the fallout from the Windscale atomic reactor mishap have increased their output.—*Mr. H. M. Gott, atomic expert.*

● Our business tycoons are digging their graves with their teeth. Why not put a tax on them—to be levied on expensive meals at restaurants and hotels, for those who over eat largely at the taxpayer's expense?—*Mr. Douglas Houghton,* M.P.

● It would appear that when French kitchen-jargon gave us "bisque d'homard" it is really saying "pigeon stew of lobster" or with an older usage "biset de pichon," "pigeon of pigeon." But what, then, is a bisque at golf.—*Peterborough in Daily Telegraph.*

● Eating is a continuous process at Brighton. There are whelks and jellied eels and doughnuts and *two*-coloured candy floss and oysters and humbugs and frankfurters and bubble gum and fish and chips (in an air-conditioned bar) and nine flavours of rock.—*Evening Standard.*

● As long as we in the trade are careful not to use the word "cream" where dairy cream is not used, I don't mind what the customer calls it, for I am certain that a prosecution would not succeed.—*Mr. E. F. Mitchell, National Assoc. of Master Bakers, Confectioners and Caterers.*

● After the spaceman has eaten his canned rations during his rocket to the moon he'll probably turn around and eat the can too. Food, and other supplies packed for space travel be cause of the weight problem, will be made of vitamin-loaded chemical films.—*Albert Olevitch, Wright Air Development Centre.*

● Ravenous hippopotamuses in Uganda are reported to be eating everything in sight. So thousands are to be shot, but as the burial of so many enormous beasts is a major problem, they are to be used as food. I will wager that Baba Blacksheepe will be the first English hostess to serve dainty morsels of smoked hippopotamus on biscuits at a cocktail party. But what shall we do about dumped hippopotamus? Shall we retaliate by flooding Uganda with our stockpile of surplus frozen Swedish eggs?—*Beachcomber.*

Mr. Matthew Arnold, M.C.

People

MR. MATTHEW ARNOLD, born in Farndon, Cheshire in 1890, has retired from Kraft Foods, Ltd., after 22 years as their chief cheese buyer. His retirement was brought about as the result of a serious car accident in Holland in July 1957. He represents the fourth generation in a family of cheese factors, and he has been in the trade since the age of 14, except for 5 years in the 1914-18 War, when he served with the Lancashire Fusiliers and received the Military Cross. He joined Kraft in 1936, as chief of a new department dealing with the bulk purchase of cheese. He was made an alternate director in 1941 and a director in 1946.

A Fellow of the Grocer's Institute, he is one of the leading authorities on cheese and is as well known in the Scandinavian countries and Germany as in Great Britain. In 1956 he was the Supreme Judge of cheeses at the London Dairy Show.

*

DR. D. W. E. AXFORD has been appointed deputy-director of research of the British Baking Industries Research Association. He has been research superintendent since 1953 and was acting director in the interim period between Dr. Coppock leaving and Dr. Elton taking up his appointment.

*

MR. BRIAN H. TURPIN, managing director of Quickfit and Quartz, Ltd., and of Q.V.F., Ltd., members of the Triplex group of companies, has been re-elected to the council of the British Chemical Plant Manufacturers' Association.

MR. JOHN S. LEA has been appointed public analyst for Bedfordshire. He succeeds the late Mr. A. Lickorish.

*

MR. A. E. V. HOUCHEN, managing director of County Laboratories, Ltd., and MR. A. C. FABRICIUS, managing director of Beecham Overseas, Ltd., have been appointed to the Board of Beecham Group, Ltd.

Both companies are subsidiaries of the group and Mr. Houchen and Mr. Fabricius are retaining their respective managing directorships.

*

MISS E. M. LAING, senior information officer at the British Baking Industries Research Station has been elected President of the Women's Society of the Chartered Institute of Secretaries for the current year. She is an associate of the Institute and has been in charge of the library and information services at Chorleywood since her appointment in 1947.

*

DR. J. B. M. COPPOCK, director of research of Spillers, Ltd., and formerly director of research of the British Baking Industries Research Association, has been awarded the O.B.E.

Dr. Coppock is well known throughout the food industry, to which he has devoted a great deal of effort in addition to his professional duties. He has for many years been a regular contributor to FOOD MANUFACTURE, and readers will no doubt wish to join us in congratulating him on his honour.

*

MR. GEORGE B. R. GRAY, has been appointed a member of the Pig Industry Development Authority, in place of the late Mr. R. C. Gray, who was one of the original members appointed to represent the interests of commercial pig producers. He is a member of the Pigs Committee of the N.F.U. of Scotland and a member of the Scottish Pig Improvement Advisory Committee. He gave evidence on behalf of the Union to the Bosanquet Commission in 1956, whose Report led to the establishment of the Pig Industry Development Authority.

*

MR. DENIS G. HUXLEY has been appointed managing director of Yeatman, Ltd., following the death of Mr. Frank A. Woolf. Mr. Huxley was appointed to the board in 1946 and has been deputy managing director since 1950. He was educated at the Merchant Taylor's School in the City, and served as a Lieutenant-Commander in the R.N.V.R. during the war. He is particularly active on the sales side of the company having been responsible for the successful introduction and marketing of several new products.

Research at Wall's

Quite the most outstanding feature of the new laboratories established recently by T. Wall and Sons, Ltd., at The Friary, Acton, is the provision which has been made for experiments on a pilot-plant scale. The pilot plants which have been provided are illustrated above, make use in fact of single units of full-scale machinery. Thus the meat products section, shown on the right of the picture, is equipped with a full-sized sausage chopper, continuous and piston fillers, and equipment for making skinless sausages. There is also a vacuum mixer, cooking kettles, baking ovens, a retort, a can seamer, and brine-injection pumps. Attached to the pilot plant is a large chill room for carcases and meat products, which contains brining tanks for curing meats.

The ice cream section, shown on the right, is even more elaborately equipped, containing a complete plant with an output capacity of 120 gal. per hr. This comprises mixing vessels, a 200 gal. per hr. homogeniser, a high-temperature short-time pasteurisation unit complete with plate coolers, different types of flash pasteurisers, and 2 types of steam de-odorisation unit. There are also refrigerated ageing vessels, 2 fully instrumented continuous freezers, and a blast hardening tunnel. A large ice cream store is also available.

With this equipment at their disposal, as well as the more usual laboratory facilities, the staff of some 50 chemists, physicists, micro-biologists and laboratory assistants, under the direction of the company's chief chemist, Dr. S. M. Herschdoerfer, are able accurately to reproduce factory conditions, so that the results of their experiments have immediate validity on a factory scale.

Tribute to Cockade

A tribute to *Cockade* milk powder comes from the leader of a Cambridge University expedition to study the Svartisen ice cap in Northern Norway. The purpose of the expedition was to study the Karst topography of the area and particularly to assess the part played by glaciation in erosion and weathering.

"Hard work during the day and a diet of dehydrated food created a thirst which we used to quench in the evening with hot drinks, using milk made from Fisons *Cockade* milk powder. We also used milk in cooking and for making sweets and blancmanges.

We had a plentiful supply of milk powder—this was fortunate because it was very popular with the members of the expedition."

The popularity of *Cockade* was said to be in part due to the fact that the ton of supplies and equipment sent out with the ten-man expedition had to be carried on the men's backs to the final camp: *Cockade* milk powder weighs a fraction of the equivalent amount of liquid milk and, of course, takes up far less space.

During ten weeks, the expedition explored over two dozen caves, including Larshullet, the deepest cave in Northern Europe, surveyed glaciers, climbed a number of the high peaks on the Svartisen ice cap—and consumed some 60 lbs. of milk powder.

Metering pumps

The chemical pump division of the Candy Filter Co., Ltd., has been formed into a company called Metering Pumps, Ltd. It's address is: 21, The Mall, Ealing, London, W. 5. Telephone Ealing 4024.

Erections and Extensions

Times Food Manufacturing Co., Ltd., are extending their factory at Lattbridge Road, Eastbourne, Sussex.

▪

Southdown Bakeries, Ltd., are planning to have a £35,000 bakery built at Stevenson Way, Crawley, Sussex.

▪

S. Hill and Son, Ltd., are having extensions erected to their bakery in Longlands Road, Middlesbrough, Yorks.

▪

Symbol Biscuits, Ltd., are having extensions built at their biscuit bakery in Devonshire Road, Blackpool, Lancs.

▪

H. P. Bulmer and Co., Ltd., are planning to build extensions to their cider mill at Moorfields Works, Hereford.

▪

Brookes Biscuit Co., Ltd., are having extensions built at first floor level at their bakery in Sharston Road, Northenden, Manchester.

▪

Kingston Deep Sea, Ltd., are planning to build a cold store and plant room on a site at Havelock Street and Scarborough Street, Hull, Yorks.

▪

Hosken, Trevithick, Polkinhorn and Co., Ltd., flour millers, are having extensions built to their Valletort Mills, Plymouth, at a cost of £20,000.

▪

London and Provincial Bakeries, Ltd., are having extensions built at their bakery in Progress Way, Great Cambridge Road, Enfield, Middx., at a cost of £32,000.

▪

James Almond and Sons, Ltd., bakers, have had plans prepared for the proposed erection of a bakery on a site at Shady Lane, Baguley, Manchester.

▪

Thomas and Evans, Ltd., are planning to enlarge their mineral water factory at Cumberlow Avenue, Croydon, Surrey, and are having a storage depot built on a site adjoining Salthouse Lane and Wellington Street, Yeovil, Somerset, at an estimated cost of £7,600. They are also planning to have a depot built at Hove, Sussex.

COMPANY PROFITS AND PROSPECTS

Reckitt and Colman raise dividend

Reckitt and Colman Holdings are to raise their final dividend by 1% to 8% making a total of 12% for the year ended December 31, 1957.

The consolidated trading profits were maintained at £8,195,702 (£8,135,618). The net profit was £3,669,823 (£3,555,361).

*

Telcon Group net profits soars

According to the annual report of the chairman of the Telegraph Construction and Maintenance Co., Ltd., the 1957 profit of the group before taxation rose by 26% to £626,274.

A final dividend of 3½%, less tax, together with a cash bonus of 2½%, less tax, was recommended by the directors.

*

Beecham sales bound

The preliminary results of the Beecham Group show that the sales of the group have risen by 18% to £34 million while the profits before tax have risen by 36% to £5·9 million.

A final dividend of 9% is recommended making a total equivalent to 20% for the year on the enlarged capital against the equivalent of 16¼% for the previous year.

*

Record year for Danish Bacon

Reviewing the activities of the Danish Bacon Co., during the past year the chairman said that the profits were somewhat higher than last year.

The group profits amounted to £516,365 (£417,913), for the year ended December 31, 1957. The total amount available for distribution was £282,682.

It was reported that during the last 5 years the volume of trade had more than doubled.

*

Mackintosh report trading difficult

Trading in the current year is certain to be more difficult and some reduction from the 1957 record level of profits must be expected, according to Lord Mackintosh, chairman of John Mackintosh and Son.

The sales at home and abroad had increased by approximately 12½% during 1957, but it was reported that the sales during the current year were less buoyant. Factors such as the North American trade recession made it difficult to forsee into the economic future.

During 1957 the group's profits had advanced to £1,620,325 (£1,444,483).

A final dividend of 7½% makes a total of 10% on the capital as increased by a 100% scrip issue, equivalent to 20% on the old capital against 15% for 1956.

Rowntree's profits highest ever

Records sales and increased profits were reported by Mr. Lloyd Owen, chairman of Rowntree and Co., Ltd., when he made his annual statement. The group net profits for the year ended December 31, 1957, amounted to £3,155,528 before taxation.

A dividend of 8% less tax making a total of 11½% less tax for the year was recommended.

*

Associated Chocolate profits fall

The directors of Associated Chocolate Manufacturers consider that the group profits for 1957, £318,772 against £339,784 for the previous year, were quite satisfactory in view of the rising costs and the keen competitive conditions in the industry. The dividend is maintained at 15% for the year.

*

Henry Simon profits

The group profits of the Henry Simon group during 1957 amounted to £1,147,190 (£1,083,848). Of that amount, £472,456 (£442,017) was attributable to the members of Henry Simon (Holdings), Ltd. A final dividend of 7½%, less tax, making a total of 20% for the year, was recommended by the directors of Henry Simon (Holdings), Ltd.

*

United Molasses slump

Mr. G. W. Scott, chairman of the United Molasses Co., Ltd., reported that the fall in the price of molasses had caused the writing down of stocks by £604,500 and another £126,000 had been provided against high price molasses supply contracts remaining undelivered at the end of 1957.

The gross profits of the group for the year amounted to £6,573,322.

Looking forward to 1958 it was reported that as a result of more competitive prices the company could hope to sell more molasses for cattle feed despite low grain prices.

*

New drink well received

The introduction of a new drink *Jusoda* had been more than justified by the sales figures in a year when the summer weather had not been too good and the demand for the more well-known drink *Tizer* had continued, according to the annual report of the chairman of Tizer, Ltd., Mr. Fred Pickup.

He reported that the result of the year's trading had been the establishing of a new record consolidated trading profit figure of £254,196 after taxation.

A final dividend of 15%, making a total of 20% for the year, plus a cash bonus of 10%, less tax, was approved.

"Ten o'clock test" success

There is no doubt, according to the annual statement of the chairman of Crosse and Blackwell (Holdings), Ltd., that the "Ten o'clock Tested" theme, which is applied to all their Crosse and Blackwell products, has created something of value to the whole group. He reported that the theme had been successfully adopted by their overseas subsidiary companies.

The trading profit of the group had increased to £1,269,300. Tax reduced the net profit to £527,617. A total dividend for 1957 of 12½% was adopted.

*

Satisfactory progress by John Dale

The net profit for 1957, after deducting minority interest in Canadian subsidiaries, amounted to £300,946 compared with £254,679 in 1956, according to the managing director of John Dale, Ltd., Mr. Robert Carr, M.P.

He also reported that their subsidiary company John Dale (Canada), Ltd., had now emerged as a profit making concern.

The parent company has received Treasury approval for making an increase in the issued capital of the firm. It is proposed that it should be increased from £800,000 to £1,300,000.

A final dividend on 15% making a total of 25%, was recommended. This compared with 22½% for the previous year.

*

Profits for Cadbury

The British Cocoa and Chocolate Co. which includes Cadbury Bros., Ltd., stepped up its sales of chocolate and other cocoa products over the past year to a record figure of £82½ million—although there was a slight fall in sweets consumption generally in this country.

Despite a substantial rise in the price of raw cocoa over the past twelve months—Ghana and Nigeria had poor harvests due to abnormal rainfall—this caused "a slight increase in the price of some of our principal lines," according to Mr. Laurence Cadbury, chairman of Cadbury Bros., Ltd.

Mr. Cadbury comments that sugar supplies were affected by the operations of the new Sugar Board. The board initially announced a surcharge of 1s. 2d. per cwt. on sugar, later removed it, introduced a distribution payment of 4s. 8d. in its place, but is back to imposing a surcharge, this time of 11s. 8d. per cwt.

Referring to milk and dairy produce it was reported that last year the cost was over £6,000,000.

Food News Overseas

MOBILE FISH INSPECTION LABORATORY

The Inspection and Consumer Service of the Canadian Federal Department of Fisheries, has recently put into operation in the Maritime provinces of Canada, a new fish inspection facility, in the form of a mobile fish inspection laboratory. This consists of a truck-trailer assembly which houses a fully equipped, up-to-date research laboratory, illustrated above.

The new facility provides supplementary service to that given to the fishing industry by the Department's inspection laboratories at Halifax, Shediac, St. Andrews, and Charlottetown, as well as two smaller mobile laboratories.

The new laboratory is based in Halifax and is capable of providing complete technological service anywhere in the Maritimes area on short notice. It is 34 ft. long and 8 ft. wide, and has been carefully designed to allow adequate working and storage space in addition to the special equipment needed to investigate problems encountered in fish and shellfish processing and packing.

Australian dried fruit record

Dried fruit growers at Mildura, which is Australia's most important producing area, expect more than £6 million for this year's crop—£616,000 more than last year. The crop was reported to be of exceptionally high quality.

Fruit drying in Australia

New automatic drying machines for Australia's currants, sultanas and raisins will probably eliminate extensive losses for dried fruit growers during bad weather. The lots recently offered for sale came from a very good weather crop.

Heavy rain during the packing season can send fruit mouldy under the system which provides for partial drying on racks and later sun treatment of fruit. Because there was no alternative to this system in uncertain or wet weather, loss of production has frequently been high in the past.

Two years of experiments in dehydrating fruit by sealing the racks and using special drying machines have proved successful. Now Australian dried fruit growers can use the alternative system in wet years

Indian chutney promotion

The export of chutney products from India is receiving the support of both the Indian Government and the industry who are combining to carry out an intensive drive.

The average production of chutney made exclusively from mangoes is estimated to reach 700 tons per year, 82% of which is exported to Great Britain, the U.S.A., Malaya and Canada. The main production centres for the production of mango chutney are reported to be Calcutta, Bombay, Madras and Bangalore.

Dominican plastic container factory

The Dominican Republic Development Commission states that among new industries planned for the Republic is a factory for the manufacture of plastic containers. These will be used for the packaging of Dominican crops, particularly bananas.

Australian dairy produce

A statutory levy on Australian butter and cheese producers has been proposed by the Australian Government to help finance a research and promotion programme for Australian dairy produce.

Both programmes would be handled by a special committee of the Dairy Produce Board.

Polish food machinery

Up to the present the Polish food industry has relied almost entirely on imported machinery for processing. A start has now been made, however, on the domestic production of a number of types of equipment, and this year 74 new types of machinery for the food industry will come into production. A recent exhibition at the Warsaw Polytechnic presented a range of the products for the food industry now being manufactured in Poland. Items displayed included a universal fruit peeling machine, milk separators, distillery equipment and confectionery producing machinery.

Aluminium can production in U.S.

Aluminium cans are now being produced in U.S. at a lower price than steel containers. The cans are being produced on the production line at a new $2 million, 32,000 sq. ft. plant at Newport, Arkansas.

The first product of the mill, a 6 oz. one-piece seamless rigid aerosol container with a 0·014 in. wall thickness, is being quoted at $45 per thousand for quantities of 2 million or more, $50 per thousand for lesser quantities. The price for similar "tin" containers is stated to be about 2·3% higher in U.S.

An automatic manufacturing process and the development of a cheaper method of fabricating are believed to be responsible for the low price. Production is forecast at a rate of 50 million cans per year by the end of 1958. An output of 125 million cans per year is aimed at in the future.

Packaging

Self-adhesive name plates

Self-adhesive name plates have been added to the *Tickotab* range of self-adhesive products made by John Gosheron and Co., Ltd.

They can be supplied in any shape or size to fit the customer's requirements. They are supplied in a variety of base materials, and in different finishes. It is stated that there is no restriction as to style or colour.

The new name plates will adhere to most metals, wood, glass, plastic and other surfaces.

Single trip drum

A new product to reach the market is the single-trip, taper-sided *T.S.* drum made by Reads of Liverpool from light-gauge material. According to the maker it combines maximum strength and rigidity with lightness. With a diameter of 11 in. and height of 17 in., it has a capacity of 5 gal.

It is claimed for the drum that it is easily and firmly stacked, resulting in great space saving; that because it has a strong, straight side-seam it is less liable to damage in transit; and that costly return freight charges are unnecessary because of its low initial price.

The drum is available in black steel or tinplate with side-seams welded or in tinplate with side-seams re-tinned or soldered.

Both styles can be spray-painted or lithographed to the customer's own design. The tinplate drum can, alternatively, be supplied unpainted.

There is a choice of standard neck fittings among which are the 58 mm. press cap, 50 mm. *RingSeal*, polythene *FlexSpout* closure, and the 3 in. seamless neck.

Dried peas pack

A new pack for their dried peas has been introduced by Lloyd Rakusen and Sons, Ltd. Colour photography has been used to reproduce the peas in full colour on the whole area of the carton.

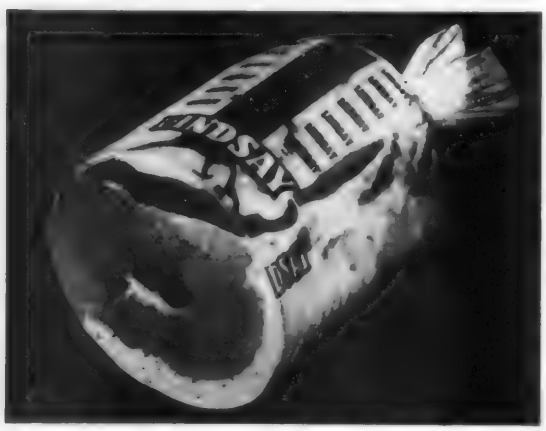
Cooked ham on show

Cooked hams pressed and encased in fibrous casings by the recently developed Meta Press were a feature of the Viskase, Ltd., stand at the Grocery, Provisions and Self-Service Exhibition last month.

This method of production is believed to have a number of advantages for both processors and retailers. The use of moulds is eliminated and, storage space is liberated and there are no mould cleaning costs. Hams are cooked in the casing taking up less space in the cooker and so increasing the productivity of the cooking department—a cooker which normally holds 100 hams is said to be able to hold 140 pressed by the Meta Press. Cooking time is reduced and is governed entirely by the diameter of the ham and not by weight, so products of varying weights can be cooked together, and all will be ready at the same time. This method enables closer quality control to be exercised during cooking. In addition, it is pointed out, the casing helps retain moisture and flavour, reducing cooking losses and increasing the yield.

These single-trip drums made by Reads of Liverpool have tapered sides for easy stacking.

A loaded skip being stacked at W. S. Shuttleworth and Co., Ltd. It was developed by Venesta, Ltd. Nested skips can be seen in the background.



This fibrous cased ham was pressed in a Meta Press.

Plywood skips

A lightweight plywood skip designed to facilitate easy stacking has been produced by Venesta, Ltd., for W. S. Shuttleworth and Co., Ltd., the chocolate manufacturers.

It is constructed as an open top box with inward-sloping sides and reinforced edges and corners. It is made in varying sizes.

The main feature of the box is a stacking device for which a patent has been applied for. The 2 opposite upper sides of the hardwood frame are rebated to form stacking ledges for the next skip. The addition of anti-jamming battens horizontally placed at opposite ends enable a number of skips to be nested.

When stacked fully loaded, the skip depends for support upon the rebated top edge, but when empty the anti-jamming battens provide the necessary ledge upon which the following skip will rest.

Trade Marks

SELFAR.—768,273. Meat; fish, poultry and game (other than live fish, live poultry and game); meat products, fish products, poultry products and game products (all for food); and preserved, dried and cooked fruits and vegetables. **Far and Wide Distributors, Ltd.,** Bank Chambers, 92, Tooley Street, London, S.E.1.

FRU-SET.—756,369 Preparations having a powder base of cornflour and agar for making custard, blancmange and the like dishes. **Creamola Food Producers, Ltd.,** 114, Cornwall Street, Glasgow, S.1.

TIKO.—B763,547. Cakes, flour confectionery and biscuits (other than biscuits for animals). **Esmor and Gertrude Roberts,** trading as Strebor and Co., Ellgood Lane, Goldenhill, Stoke-on-Trent, Staffs.

BROOKES CHOCOLATE NILE.—766,244. Chocolate biscuits for sale in the counties of Northumberland, Durham, Cumberland, Westmorland, Lancs., York, Denbigh, Chester, Derby, Notts., Lincs., Staffs., Salop, Warwick, Worcs., Glocs., and Somerset and in the City and County of London. **W. J. Brookes and Co., Ltd.,** Skerton Road, Old Trafford, Manchester, 16.

FIZZEE-JIGS.—766,574. Non-medicated sugar confectionery, chocolates and toffees, all containing effervescent ingredients. **J. Whitehouse and Co., Ltd.,** Mascot Works, Church Road, Tarring, Worthing.

REFFINO.—766,919. All goods in Class 30, not including coffee, coffee essence, wheat flour or any goods of the same description. **The Grocer Supply Co., Ltd.,** 33-41, Kelvin Avenue, Hillington, Glasgow, S.W.2.

UNIDEC.—767,689. Edible cake decorations. **The United Yeast Co., Ltd.,** 171-174, Tottenham Court Road, London, W.1.

AMANDA.—767,690. Chocolate, chocolates and non-medicated confectionery. **Chocolat Tobler, Ltd.,** 20, Soho Square, London, W.1.

DELUSHFUL.—768,345. Sugar confectionery and chocolate confectionery, none being medicated. **Hall Bros. (Whitefield), Ltd.,** The "State" Confectionery Works, Stanley Street, Whitefield, nr. Manchester.

"TOTEMS."—768,426 and **"BOATERS."**—768,427. Non-medicated sugar confectionery and chocolates. **Robertson and Woodcock, Ltd.,** Trebor House, Woodford Avenue, Ilford, Essex.

LORDSUN.—767,605. Fresh fruit and fresh vegetables. **Gaetano Ferrigno,** 10, Victoria Street, Liverpool, 2.

GRANUSOL.—768,140 and **GRANUPRO.**—768,142. Animal feeding stuffs. **Marfleet Refining Co., Ltd.,** St. Andrew's Dock, Hull, East Yorks.

REFFINO.—766,920. Non-alcoholic fruit-flavoured drinks. **The Grocer Supply Co., Ltd.,** 33-41, Kelvin Avenue, Hillington, Glasgow, S.W.2.

SUNBLOOM.—768,104. Non-alcoholic drinks and preparations for making same; and fruit juices. **Edwin Gray and Co., Ltd.,** Plantation House, London, E.C.3.

STELLA.—756,415. Soups and preparations in the form of granules and cubes for making chicken, beef, tomato gravy, chicken noodle, cream of tomato, vegetable, pea, mushroom and cream of asparagus soups. **Star Stabilimento Allmentare,** Via 25 Aprile N.5, Muggio, Milan, Italy.

SUNNYWHEAT.—762,014. Bread for sale in the counties of Surrey and Kent; and for sale in the counties of London and Middlesex. **Royal Arsenal Co-operative Society, Ltd.,** Parsons Hill, Woolwich, London, S.E.18.

MAM'S PRIDE.—764,805. Bread, cakes and biscuits (other than biscuits for animals). **W. J. Brookes and Sons, Ltd.,** Skerton Road, Old Trafford, Manchester, 16.

Technical Press Review

July

World Crops.—Forage Crops and Silage: Production from the Hills; Forage Crops and Silage; Pasture Grasses and Legumes in Northern Ireland; Grasses for Grazing in East Africa; National Silage Demonstration; The Need for Lime.

Dairy Engineering.—Some Implications of Automation in the Dairy Industry; Advanced Mechanisation—The Way to Automation; Plant, Equipment and Services for Automation; The Function and Application of Refrigeration in the Dairy Industry; Large-Scale Processed Cheese Plant.

Manufacturing Chemist.—Water treatment: Review; Water Conservation and Purification; Wetting Agents for Agricultural Sprays; Perfumes for Face Powders; Chemical Structure and Odour; Progress Reports: Detergents and Detergency; Disinfectants; Pest Control Chemicals.

Chemical Processing and Engineering.—Packed Fractionating Columns; Mechanisation in the Laboratory; World's Newest Paper Board Mill.

Automation Progress.—Industrial Electronics Has Come of Age; Analogue Computer Predicts Radioactive Fallout; Semi-Conductors and their Uses; Production Control in the German Motor Industry; Instrumentation of Process Plant.

Atomics and Nuclear Energy.—Radiation and Encapsulation; Accelerated Electrons for Commercial Irradiation; Cadmium Sulphite for Radiation Detectors; New Particle Accelerator; Irradiation in the Motor Industry; Isotopes in Meteorology; Ground Disposal of Atomic Waste—II.

Paint Manufacture.—Indian Paint Industry Progress; Labels: Silent Salesmen; Extension to PATRA House; Fundamental Studies of Adhesion.

New Companies

Andrew Purvis, Ltd. (600083.) 33/4, Saville Street West, North Shields, Northumberland. Bakers and confectioners. £3,000. Dirs.: Andrew and E. S. Purvis.

Biggins Co. (London), Ltd. (599237.) 27, Old Broad Street, E.C.2. Importers, dealers, inchts., mnfrs. and producers of tea, coffee, cocoa and other produce Dirs.: S. J. Morgan and L. C. Delamere.

Boulevard Foods, Ltd. (599947.) 206, Abbey House, Westminster, S.W.1. To carry on the bus. of bakers, confectioners, etc. £100. Dirs.: Llewellyn Williams and V. H. Madden.

Epro Products, Ltd. (600379.) Eldon Lane, Newcastle-on-Tyne, 1. Millers and mnfrs. of animal foods, etc. £10,000. Dirs.: Alice C., Kenneth P. and Edgar P. Robinson.

Excel Meat Co., Ltd. (598943.) Mnfrs. and dealers in pies, sausages, cooked meats, etc. £100. Subs.: D. J. Solomon and S. E. Q. Henriques, 199, Piccadilly, W.1.

Fatstock Finance, Ltd. (599761.) Limited by guarantee without share capital. Subs.: National Farmers' Union Development Co., Ltd., 25/31, Knightsbridge, S.W.1; Fatstock Marketing Corporation, Ltd.; James Turner; J. H. Gray, H. J. Wilson, O. Guard and R. F. Daly.

Gray's (Plymouth), Ltd. (600789.) Mnfrs. of and dlrs. in ice cream, chocolates and confectionery, etc. £1,000. Subs.: J. and T. A. Herbert, 156, Strand, London, W.C.2.

Heathpack (Sales), Ltd. (599862.) Allen House, Newarke Street, Leicester. Pre-packers, packers and mnfrs. of and dealers in and canners and bottlers of fruit, vegetables and other foodstuffs, etc. £100. Dirs.: B. H. Townsend and S. L. Spencer.

Hillyers Bakeries, Ltd. (598831.) 8, Farncombe Street, Farncombe, Godalming, Surrey. £4,000. Dirs.: G. A., C. F. G., and A. J. Woodgate.

D. H. Honour and Son (Edenbridge), Ltd. (601010.) The Water Mill, High Street, Edenbridge, Kent. Millers and flour, bran, oil cake and other foodstuff mnfrs., etc. £100. Dir.: William H. Donald.

Spencers Bromsgrove Mineral Water Co., Ltd. (600799.) 128, Worcester Road, Bromsgrove. £15,000. Dirs.: Harry, Charles S., and Gilbert E. Spencer.

Sponge Kitchens (Hayes), Ltd. (599232.) 38, Station Approach, Hayes, Kent. To carry on the bus. of sponge fancy cake and biscuit mnfrs., etc. £2,000. Dirs.: James and Doris Stewart.

Stoneley Confectionery Co., Ltd. (600883.) Midland Bank Chambers, Letchworth. £1,000. Dirs.: K. D. F. Guyton and J. C. Burges.

B. and G. Walton (Rochdale), Ltd. (599662.) 101, Toad Lane, Rochdale. Bakers, confectioners, etc. £5,000. Dirs.: Brian and Geoffrey Walton.

Worboys Bakeries, Ltd. (599304.) Alma House, Clay Cross, nr. Chesterfield. £12,000. Dirs.: Stewart I. Worboys and John Nettleship.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

796,609. R. PRESSMAN and N. DARTELL: Food wrapping sheeting.
796,674. SOC. FRANCAISE DE REGULATEURS UNIVERSELS ARCA: Installations for measuring the resistance of sugary juices.
796,889. DAWSON BROS., LTD.: Rotary filtering apparatus.
796,969. BAKER PERKINS, LTD.: Apparatus for stacking biscuits.
797,134. UNILEVER, LTD.: Oleaginous foodstuffs.
797,145. J. J. BLOW: Milk cooler.
797,147. HENKEL AND CIE. GES: Process for the manufacture of ice cream.
797,219. PETFOODS, LTD., formerly CHAPPIE, LTD.: Can aligning machines.
797,256. UNION STARCH AND REFINING CO., INC.: Coloured food products.
797,277. INDEPENDENT DAIRIES, LTD.: Manufacture of cheese.
797,298. WHITE LABORATORIES, INC.: Prepared milk for infants in sub-standard nutritional state.
797,372. L. C. GRANT, LTD.: Machines for shelling rice and other hand-kernelled grains, seeds, nuts and beans.
797,385. ARMOUR AND CO.: Method of defatting bacon skins.
797,390. USINES DE MELLE: Process for producing citric acid by aerobic fermentation of solutions containing molasses.

ABSTRACTS OF BRITISH PATENTS

Increasing the solubility of powdered milk

This invention relates to a process and apparatus for converting finely divided particles of powdered milk, a substantial proportion of the lactose of which is in the form of the anhydride, into readily soluble powdered milk having a larger particle size than the finely divided starting material and in which the greater percentage of the lactose is in the form of the mono hydrate.

It has been found in accordance with this invention that if the starting material is treated with steam for a short period of time, then the reaction temperature can be as high as 190-200°F. without damage to the protein or impairing the taste. The particles of the starting material may be evenly treated by letting the material fall in a thin, wide screen-like stream and forcing steam against a surface of the stream throughout the whole width of the surface. It has been found that the particles can be dried at a temperature of 150-180°F. without altering the taste.

The apparatus for carrying out the process comprises a means for dispersing the particles in a stream, a conveyor which causes the particles to fall in the form of a screen under the power of gravity, a steam nozzle which impinges the steam against a transverse section of the screen and also projects the particles away from the nozzle, a conveyor for collecting the particles and drying means for adjusting the moisture content of the particles.—795,364. *Mil-Ko Products, Ltd.*

Preservation of tea

According to the present invention, tea may be preserved by packing it in a material coated or impregnated with benzoic acid. The benzoic acid may be incorporated into the wrapping material.

At the time of packing it is suggested that the wrapping material should carry at least 0·4% of the weight of tea present. The impregnation is carried out by means of a solution of benzoic acid in isopropyl alcohol with a little water, as outlined 4 parts of isopropyl alcohol to 1 of water, the solution containing not less than 20% of benzoic acid by weight.—793,796. *Monsanto Chemicals, Ltd.*

Sterilising milk

It is stated in this invention that the "continuous" and the "tank" systems of sterilising milk suffer from drawbacks. In the continuous type the sterilising machine used is expensive, and to insure against loss of working time through breakdowns it is usual to employ two machines so that repairs or maintenance can be carried out. In the tank system, which is discontinuous, firstly, the tank has to be loaded, requiring an amount of time; and secondly, the process requires a large amount of steam to raise the temperature of the milk in the bottles to 230°F. The tank also has to be heated with every load, and this results in a lengthy cycle of operations. In this process a skin also forms on the milk, which makes it undesirable for the consumer.

The object of the present invention is to overcome these disadvantages. The bottles of milk are fed into a sterilising tunnel, the tunnel is closed and the sterilising is effected by steam injection.

Apparatus is provided for cooling the bottles as they come out of the tunnel. They are transferred to this device and continuously agitated while in the cooler, thereby preventing a skin from forming on the surface of the milk. The milk bottles are carried through the invention in trays which run on rails.—794,662. *Stanley Cross.*

Sterilizing bottled beer

This invention concerns the sterile filling of beer and other drinks containing carbon dioxide into bottles or other containers.

The process is characterized by the fact that the beer is heated to the sterilising temperature and put at once into sterilised bottles or cans from which it can be used immediately. The beer or carbon-dioxide-containing drink is kept under excess pressure before bottling.

There is provided for the operation equipment which has a filter plate into which the beer may be pumped and a plate-type heat exchanger connected to the filter plate for heating the liquid to a temperature necessary for pasteurisation or sterilisation. A bottle filler is connected to the heat exchanger so as to fill the bottles with heated beer, before filling, and a closure applying apparatus seals the bottles after filling. A buffer tank, partly filled with carbon dioxide gas under pressure, is arranged between the heat exchanger and the bottler filler, and an ultra-violet radiation device is fitted between the washing machine and the bottle filler.—795,625. *Holstein and Kappert Maschinenfabrik Phœnix G.m.b.H.*

Method of capping containers

A method of capping a container such as a bottle or cup with an outwardly projecting lip around the mouth of the container is the subject of this invention.

In the method a cap made of flexible material with a depression in the middle is placed over the mouth of the bottle. A head of elastic material conforming to the shape of the depression is positioned in the mouth so that upon compression of the head against the bottom of the depression the inner wall of the cap is forced into contact with the inner wall of the container mouth. The cap is folded around and beneath the lip of the container by a roller which is brought into engagement, the head providing a counter-force against the pressure of the roller.—793,900. *E. Jensen.*

Nutrient liquid obtained from coconut

This invention concerns a process for making a liquid in the form of an emulsion containing fat, proteins and carbohydrates sufficient in kind and quantity to constitute almost a whole food product. The product may be used in the same ways and with almost the same effect as cow's cream or milk (depending on the fat content). The invention also covers the resultant food product.

The starting product is the dried endosperm of fully ripened coconuts, which has been dried under hygienic conditions. After desiccation the coconut endosperm is treated with water or an aqueous solution to substantially replace the water lost during desiccation. The liquid is then separated from the solid constituents of the reconstituted endosperm by pressing.

The aqueous solution used instead of water may contain any edible material, but preferably is one containing about 1% edible salt or a saline solution mingled with the residue of a previous extraction.

The endosperm and aqueous liquid may be heated to a temperature not substantially exceeding 170°F., prior to pressing, and maintained at this temperature until the desiccated coconut is reconstituted (for example, a period of about 20 min.).—794,050. *Skinner Corporation.*

New patents are from the Journal of Patents and new trade marks are from the Trade Marks Journal. In each case permission to publish has been given by the Controller of Her Majesty's Stationery Office. Each of the publications is obtainable from the Patents Office, 25, Southampton Buildings, London, W.C.2.

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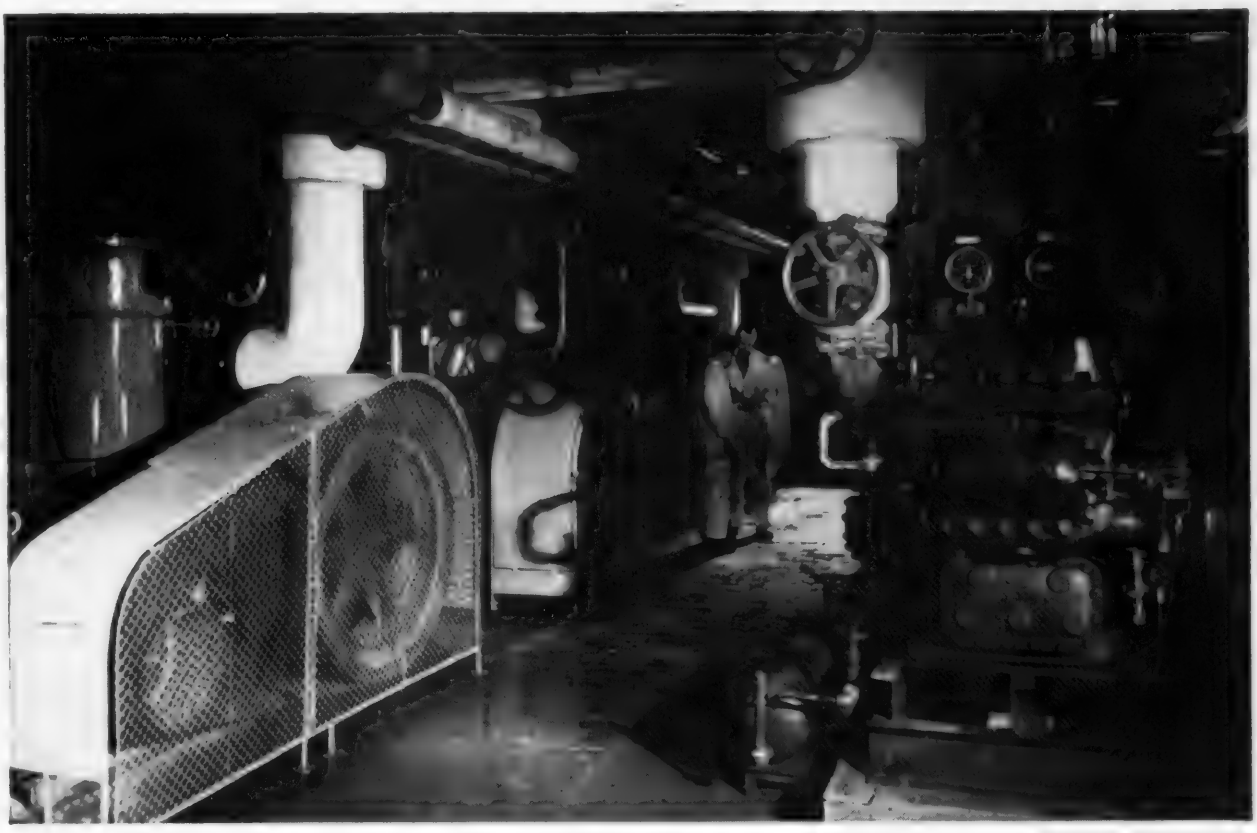

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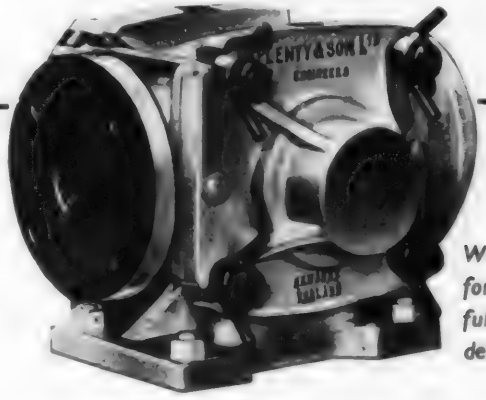

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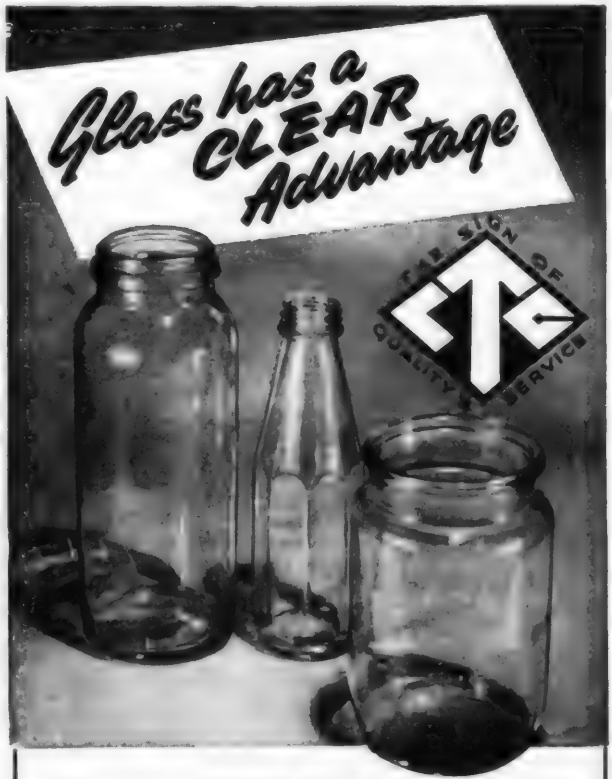

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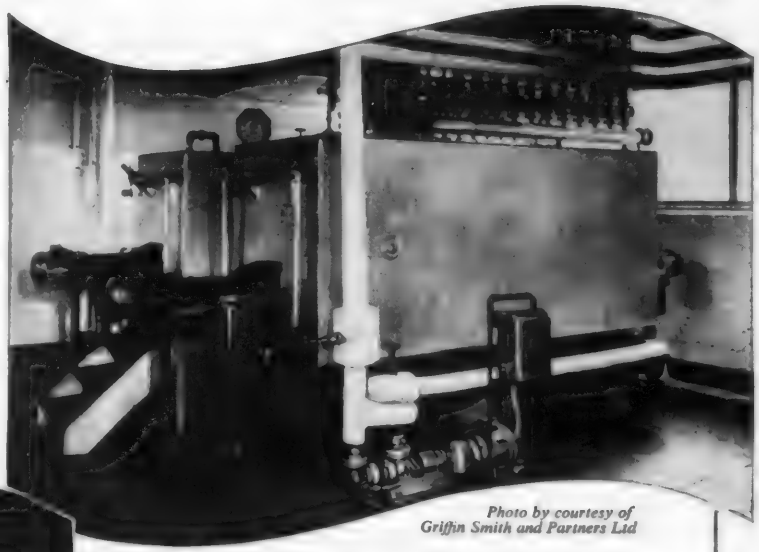

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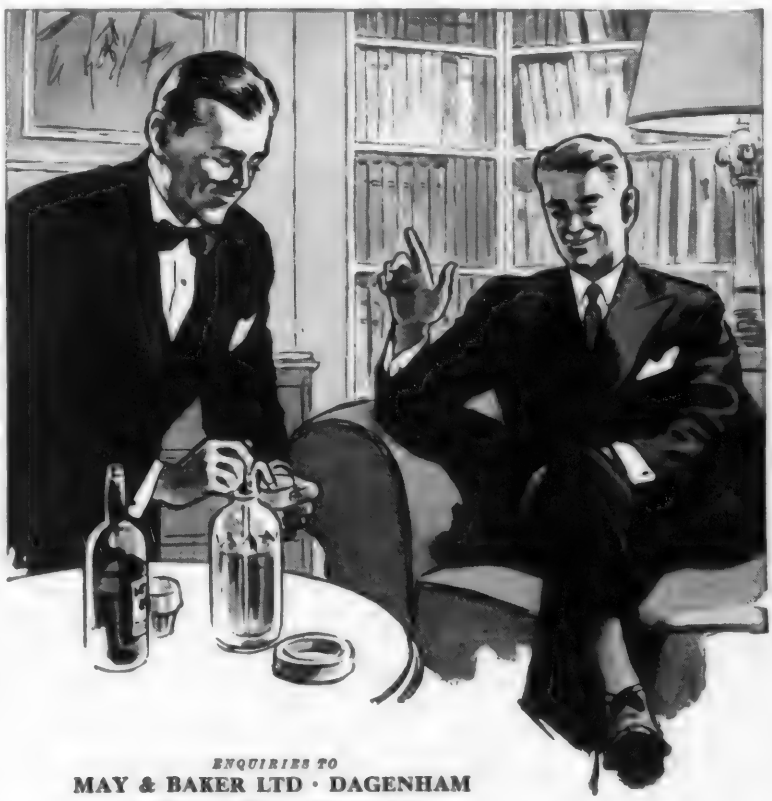

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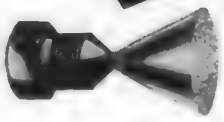

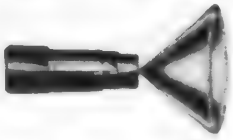

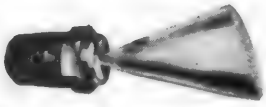

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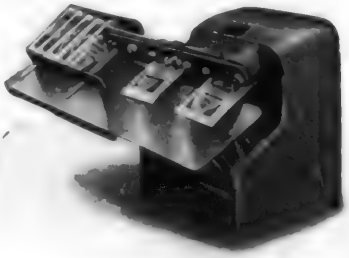

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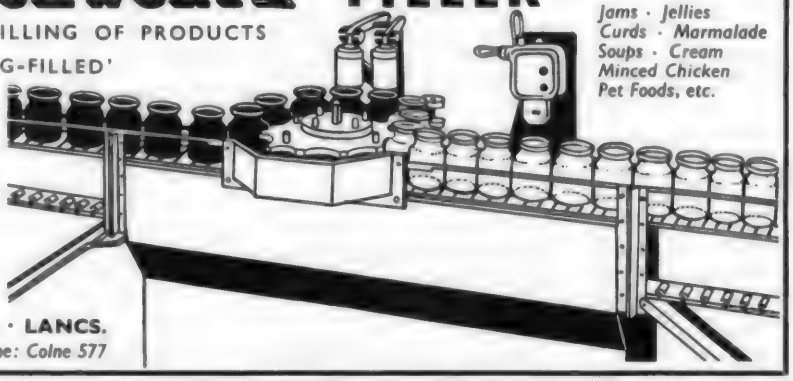

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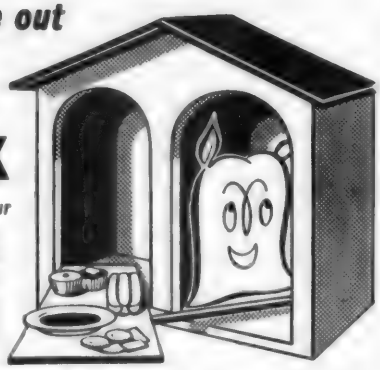

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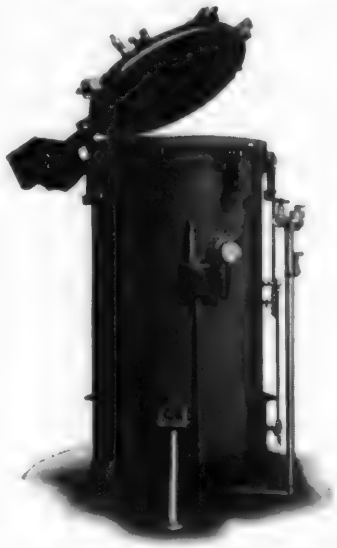

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FOR Sale: 24 in. Pelkman Rotary Biscuit Machine, six engraved rollers for same; three 80 qt. Morton Cake Beaters; B.P. 50 ft. two-pan Chain Oven; Kek No. 4 suction fed Sugar Mill; 12 in. Swift Labelling Machine on trolley; Newton vertical automatic gas-fired boiler, w.p. 80 lb.; 18-plate Vicars Wafer Oven (old); two Morton Ball Whisks; B.C.H. vertical Boiling and Stirring Pan; No. 4 Morton Duplex Mixer; three Vicars Wafer Spreaders; two 32 in. Greer Enrobers and 50 ft. cooling tunnels; Sterne U.4 Refrigeration Unit; Jahn Junior Block Shaver; 600 lb. Kellie Chocolate Kettle (old); Avery Dead Weight Spring Balance; B.P. 18-plate Wafer Oven; 3 cwt. Avery Beam Scale; B.P. Flat Bed Wafer Saw; metal Caramel Cooling Trays; 5 cwt. Morris Chain Block on rail; 8 ton Braithwaite Sectional Glucose Tank; Auto Wrapper, type "W11," Machine, delivered January 1958, packet sizes 4¾ in. by 2⅞ in. by 1⅞ in., and change parts to 4¾ in. by 4¾ in. by 1⅞ in. All plant in good mechanical order.—Can be seen by appointment at Fraser's Biscuits (Hamilton) Ltd., Hamilton, Lanarkshire. Tel.: Hamilton 267.

WE have for disposal two "Ferrum" Apple Peeling and Coring Machines, bench type, Model SM, complete with ¼ h.p. motor and starter, new 1957, £120 each.—Write or telephone, Ledbury Preserves (1928) Ltd., Ledbury, Herefordshire. Tel.: Ledbury 48.

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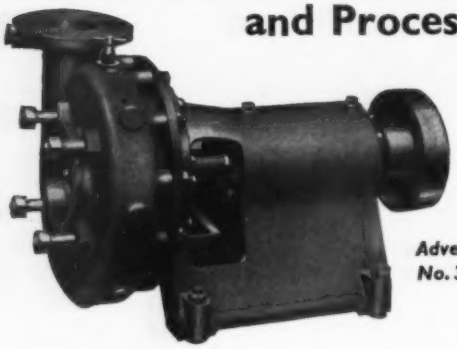

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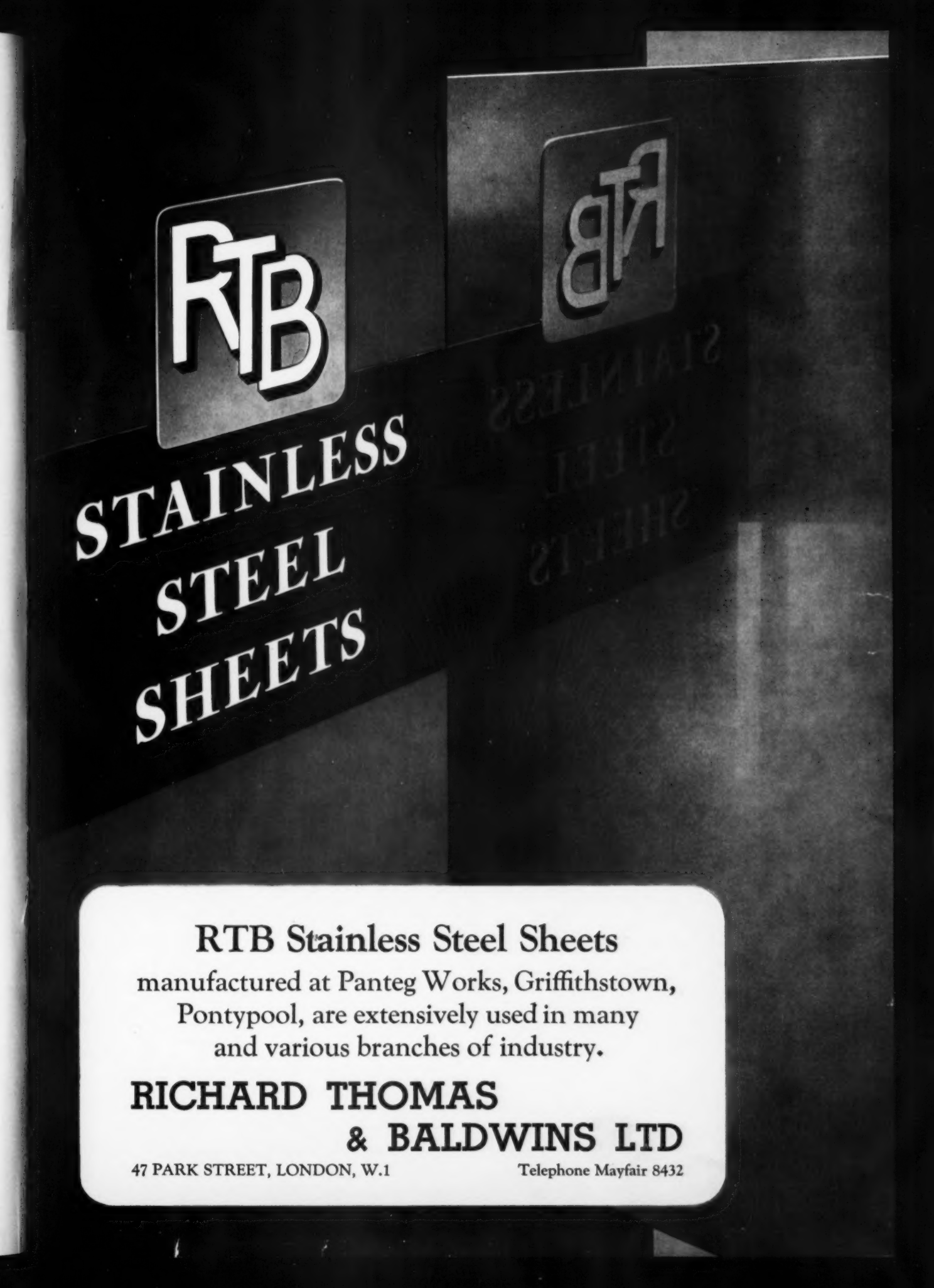

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